

S. Columbaria is native in the Old World. Since it is sometimes cultivated in this country, the occurrences mentioned above may have originated from garden sources. No other North American collections are available in the Cornell University Herbarium, suggesting that this perennial is a very recent addition to our introduced flora.—R. T. CLAUSEN, Department of Botany, Cornell University.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF
HARVARD UNIVERSITY—No. CXLVIII

M. L. FERNALD

(Plates 749–769)¹

DURING the studies necessary in a thorough revision of the flora of northeastern America and, especially, a checking with photographs of the types of Linnaeus, Michaux and other authors of American species much new matter has accumulated. Some of the studies, with photographs by Dr. Bernice G. Schubert, are here presented.

I. FIVE COMMON RHIZOMATOUS SPECIES OF
MUHLENBERGIA

(Plates 749–757)

In eastern North America five species of *Muhlenbergia* stand out as the most common representatives of the rhizomatous members of the genus, the plants passing, mostly erroneously, as *M. mexicana* (L.) Trin., *M. sylvatica* Torr., *M. foliosa* (R. & S.) Trin. and the two very distinct species included under *M. racemosa* (Michx.) BSP. These five species have many technical differences (in glumes, lemmas, anthers, grains, internodes, nodes, sheaths, etc.) and habitally they are distinctive. The names currently applied to them, however, need most careful scrutiny for, when the types (all but one in Europe) are studied, it is apparent that those who have easily recognized the species involved have largely guessed at their names and, too often,

¹ The cost of engraver's blocks has been met in part from an appropriation for original research from the Department of Biology, Harvard University.

have not consulted the original descriptions. Sixteen years ago I undertook a clarification of our species, at that time securing from friends in London, Paris and Berlin photographs of many of the types involved; and in 1930, while in Europe, I checked many points not shown in habit-photographs.

As a result of this study it was evident that we must adopt many unfamiliar names or change the significance of those now familiar but, disliking the upheaval necessitated, I have refrained from publication, with the hope that specialists on the *Gramineae* would take the responsibility of correcting the many errors. Having now reached a stage in my work when the facts can no longer be dodged, I am presenting in key-form the diagnostic characters of the five species. This will be followed by consideration of the names now in use and those which, it seems to me, must be taken up. In some instances, however, inability at present to consult many critical specimens abroad may result in slight future changes. In his Manual Hitchcock¹ adopts for

¹ I am credibly informed that Hitchcock strenuously and rightly objected to these absurd names, which were forced into his book through the ruling of his Chief (see Hitchcock, Man. 14), an illustration of the type of intellectual freedom allowed scholarly and original workers in some branches of our "free and democratic" government. In view of the fact that true and heretofore misinterpreted *Muhlenbergia racemosa*, as stated on one of the labels before me, "Grows in the driest of soil" one wonders how long the inspired name "Marsh Muhly" will be the "standard" name for it. Its originator obviously intended the name for *M. setosa*, a wholly distinct species of bog, swale, peaty meadows and wet shores. Incidentally, the emended name as "Muley" would be wholly inappropriate for either *M. racemosa* or *M. setosa*, species which differ from the others by the very prolonged awns of their glumes; muley, as every farmer-boy knows, implies lack of horns. The prolific inventor of "English" names flatly discriminated against *M. sylvatica*, *M. "foliosa"* and many others, allowing them no "English" names, although they are thoroughly distinct and abundant species. This was perhaps fortunate, for the binomials generally applied to them are so liable to upset when studied by scientists. If the time used in inventing "English" names for these plants had gone into study of their proper typification some of the upsets in the following pages might be unnecessary. "C'est à rire!"

À propos the reference to dictatorship by some in power over young (sometimes older) scientists, I have recently received copies of correspondence from a botanist formerly in government employ, in which the inventor of "English" names ruled that the young man should not publish a new plant in RHODORA because the type is not in the National Herbarium and because the author had followed the International Rules of Plant Nomenclature, though in this case the dictator was overruled by still higher officials. Probably no more severe blight upon scholarly development of taxonomy under federal dictatorship has existed. The inventor of "English" names himself once made a weak effort in taxonomy. That he did not "arrive" is clear from his greatest monograph, with its delightfully naïve key:

- Leaves obovate, etc.
- Leaves not with all the characters given above, etc.
- Leaves not exceeding 2 cm. in length, etc.

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members of *Muhlenbergia* the stupid "English" name "Muhly" ("Marsh Muhly", "Wire-stem Muhly", etc.). There would be some propriety in dropping the *h* and then applying the word as an adjective to the current nomenclature of the misinterpreted five. In tabulating the characters I am numbering the species, the name in current use being bracketed. Beautifully clear illustrations of four of the plants will be found in Hitchcock's Manual, figs. 768, 770, 774 and 776. I am greatly indebted to Mr. Jason Swallen for an opportunity to study fragments of the types of *Agrostis mexicana* L. and of *A. foliosa* R. & S. Photographs made from them will be found in PLATES 749, FIGS. 1-3 and 751, FIG. 2).

- a. Rhizomes and stolons 2-6 mm. thick, with cucullate-arching ovate scales; nodes of culm thick and abruptly enlarged; panicles usually arching, their branches evident; glumes shorter than to about equaling lemma, the longer 2-3.5 mm. long; base of lemma with straight and rather stiff beard; anthers 0.3-0.6 mm. long . . . b.
- b. Culms loosely ascending to geniculate and rooting at lower nodes, freely branching from basal and middle nodes, the branches soon forking, the plants thus becoming bushy in habit and topheavy, the promptly uncovered internodes lustrous and glabrous; leaf-sheaths loose, laterally compressed, promptly opening to base; terminal panicle exerted, or with included base, at first lax and open, lanceolate to slenderly pyramidal or ellipsoid, later with appressed branches; lateral panicles in axils of many leaves, partly included; many spikelets slender-pedicelled; glumes very unequal, both awned, membranaceous, green or purplish; lemma membranous; grain easily loosened, linear-cylindric, 1.6-2 mm. long . . . 1. [*M. mexicana*].
- b. Culms erect or ascending, lower nodes not rooting, unbranched or with erect or ascending mostly simple branches from middle nodes, internodes largely covered by sheaths, opaque and puberulent; leaf-sheaths tight, terete, tardily opening to base; panicles all or nearly all terminating culms and erect branches, mostly exerted, linear- to oblong-cylindric; glumes subulate-tipped (if rarely awned, subequal).
Erect, with few simple appressed-ascending branches; leaf-blades ascending or slightly spreading, firm; panicles rather stiff, the sessile to short-pedicelled spikelets densely imbricated and extending to bases of the glomerulate appressed-ascending branches and branchlets; glumes subequal, firm and herbaceous, usually green or

Leaves not with all the characters given above.

Leaves orbicular to oval, etc.

Leaves or other parts not as described above.

and so on, including the informative calls in the key "Leaves not as described". It is no wonder that one who got little deeper than that into an exacting field did not fully understand its importance.

purplish; lemma firm, usually awnless (rarely awned); mature florets persistent; grain slenderly ellipsoid, 1.3–1.6 mm. long, tightly embraced by lemma and palea.

2. [*M. foliosa*].

Ascending to erect, with many ascending simple or forking branches from middle nodes; leaf-blades spreading, rather soft and pliant; panicles slender, loosely flowered, flexuous, the longer branches mostly without crowded basal spikelets, the spikelets often long-pedicelled; glumes very unequal, scarious or hyaline, usually whitish or silvery; lemma scarious, silvery, often long-awned; mature florets promptly dropping; grain linear-cylindric, 1.4–2.1 mm. long, easily removed. 3. [*M. sylvatica*].

- a. Rhizomes and stolons slender (2–4 mm. thick), greatly prolonged and forking, with appressed lanceolate to narrowly oblong prolonged scales; nodes of culm gradually enlarged upward; panicles all at tips of culms or branches, stiff, lobulate-spiciform (especially at summit) the stiff branches densely flowered to base; glumes much exceeding lemma, subequal, linear-attenuate and long-awned, 4.5–8 mm. long; lemma slenderly villous at base; anthers 0.5–1.5 mm. long; ripe florets tardily dropping.

Culms mostly branching from middle nodes, the leaves and branches there approximate, the internodes lustrous and glabrous; leaf-sheath acutely keeled, the prolonged ligule 3–5 mm. long; anthers 0.5–0.8 mm. long; grain tightly embraced, linear-cylindric, 1.8–2.2 mm. long; species of dry prairie, rocks and bluffs from Wisconsin to Saskatchewan, and west to Oregon, south to Illinois, Missouri, Kansas and New Mexico; casual along railroads eastward

4. [*M. racemosa*].

Culms simple or with few erect basal branches; the internodes opaque and puberulent; leaf-sheath with rounded midrib, scarcely keeled, the inconspicuous ligule 0.5–1.5 mm. long; anthers 1–1.5 mm. long; grain easily freed, oblong-cylindric, 1.2–1.5 mm. long; species of bogs, wet meadows, wet rocks and shores, from Newfoundland to Alberta, south to North Carolina, Indiana, Wisconsin, Minnesota, Wyoming, Nevada and Oregon. 5. [*M. racemosa*].

TRUE *M. MEXICANA* (PLATES 751 and 752)

Muhlenbergia mexicana (L.) Trin. Gram. Unifl. 189 (1824) rests upon *Agrostis mexicana* L. Mant. i. 31 (1767). *Agrostis mexicana* was raised by Linnaeus in the garden at Upsala from seeds sent him from Vienna by Jacquin and erroneously thought to have come from tropical America. By most recent authors it is considered to be species no. 1 of the preceding key: “the plants becoming topheavy and bushy”, to use Hitchcock’s phrase, with abundant decumbent and rooting or ascending often forking lustrous branches; the sheaths compressed and loose, promptly opening to the base; the branches bearing numerous partly included axillary panicles; the terminal panicles relatively

soft and loose upon expanding, many of the spikelets long-pedicelled; the glumes very unequal and both awned; the easily removed grain linear-cylindric, etc. How different was the unusually full description by Linnaeus of his *Agrostis mexicana*:

mexicana. 20. AGROSTIS panicula oblonga congesta, calycibus [glumis] corollisque [lemmatibusque] acuminatis subaequalibus muticis. *Habitat in America calidiore. D. Jacquin . ♂*
Culmi numerosi, pedales, laeues, erecti. Ramis indiuisis. Folia laeviuscula ligula truncata. Panicula viridis, oblonga, non patens, sed congesta coaceruatis numerosissimis viridibus floribus. Flores scabri. Calyces apice subulati, subaequales, parum scabri. Corollae longitudine calycis, apice similiter acuminatae, basi pilosae. Aristae nullae. Stigmata atropurpurea, ramosa. Stamina alba. Difficillime hoc Gramen determinatur. Altero anno floret. Facies Cinnae.
 H. U.

Passing for the moment the "*panicula oblonga congesta*" or "*congesta coaceruatis*", it should be clear that the "*culmi . . . erecti*" the "*Ramis indiuisis*" and the "*Calyces [glumae] apice subulati, subaequales*" do not belong to species no. 1, which has often decumbent or lopping culms with mostly forking and very abundant basal and median branches, the glumes very unequal and both slenderly awned. The "*Aristae nullae*" could belong to no. 1 or to no. 2. Linnaeus said nothing about the very numerous axillary panicles partly included in the subinflated sheaths of the branches which so generally characterize no. 1. His unusually full description is clearly not a good one for no. 1 and, in view of the almost universal recent error of so identifying it, the original comment of Linnaeus still has force: "*Difficillime hoc Gramen determinatur*". Linnaeus had two sheets of the type material, both clearly marked by him *Agrostis mexicana*. Beautiful photographs of the two sheets, sent to the Gray Herbarium in 1927 by the late Dr. B. Daydon Jackson, are before me. One is of a badly crumpled specimen, the other (our PLATE 751, FIG. 1) better prepared. They both show erect culms, with few simple erect branches, tight sheaths, terminal panicles, no definitely included axillary panicles, subequal awnless glumes (PLATE 751, FIG. 3) and awnless lemmas; and the broken-off culms are 5 dm. (20 inches) high. Linnaeus's "*culmi . . . pedales*" was too conservative. PLATE 752, FIG. 2 is from a portion of the panicle of the type, now preserved at the United States National Herbar-

ium and most generously sent me for study by Mr. Swallen. The type specimens of *Agrostis mexicana* are of species no. 2, the plant passing as *Muhlenbergia foliosa*.

As he stated, Linnaeus received his seed from Jacquin and raised the plant at Upsala. Jacquin's plant at Vienna was clearly described, and illustrated by a life-size colored plate, by the younger Jacquin in his *Eclogae Plantarum Rariorum*—Gram. Fasc. ter. et quart., 44, t. 30 (1813). Jacquin filius departed little from Linnaeus, his fuller account including "CULMI . . . bipedales, . . . erecti, . . . teretes . . . ; ramis axillaribus, erectis, distichis, adpressis . . . vaginis . . . apertis . . . FLORES in paniculis terminalibus culmi primarii et ramorum, ante et post anthesin coarctatis, . . . ; ramis ramulisque . . . erectis adpressis . . . Calyx . . . Glumae subaequales, lanceolatae, acuminatae"; and his wonderful plate (our PLATE 752) showed a characteristic plant of our species no. 2, even to the slenderly ellipsoid grain. The material cultivated by the Jacquins at Vienna was, then, like that sent to and cultivated by Linnaeus at Upsala and described by him as *Agrostis mexicana*. When he transferred *A. mexicana* to *Muhlenbergia*, Trinius, Gram. Unifl. 189 (1824) held the diagnostic characters of the Linnean species "Panicula contracta densiuscula; Glumis lineari-lanceolatis acutissimis subaequalibus perianthio acutissimo vix brevioribus". There seems to be no way to avoid taking up for the plant erroneously passing as *M. foliosa* the clearly described and typified *M. MEXICANA* (L.) Trin.

M. MEXICANA OF RECENT AUTHORS (PLATES 749 and 750)

When we consider the earlier available names for the plant recently but erroneously passing as *Muhlenbergia mexicana*, our species no. 1, the name seemingly available, if we accept current bibliographies, is *M. lateriflora* (Michx.) Trin. ex Kunth, Enum. i. 207 (1833) in synonymy of *Cinna lateriflora* Kunth, Rev. Gram. i. 67 (1829), both names based on *Agrostis lateriflora* Michx. Fl. Bor.-Am. i. 53 (1803) from rock-cliffs of the Mississippi and shores in [southern] Illinois. Michaux's description is not at all good for a plant with geniculate and bushy-branched stems, relatively large terminal panicles and long-awned glumes;



Photo. B. G. Schubert.

MUHLENBERGIA FRONDOSA: FIG. 1, characteristic decumbent branch, $\times \frac{1}{3}$; FIG. 2, characteristic glabrous internode, open and compressed sheath and partly included panicle, $\times 5$; FIG. 3, portion of rhizome, $\times 4$.



Photo. B. G. Schubert.

MUHLENBERGIA MEXICANA: FIG. 1, type of AGROSTIS MEXICANA, $\times \frac{1}{2}$; FIG. 2, portion of panicle of type, $\times 5$; FIG. 3, spikelets, $\times 10$.

and the photograph of the type sent me by M. Cintract is very inconclusive. The description was as follows:

LATERIFLORA. A. culmis erectis, nodosis: foliis linearibus, planis: paniculis lateralibus et terminalibus, pusillis, coarctatis, densifloris: glumae muticae et scaberulae valvis acutissimis; interioribus majoribus, basi barbulatis.

Hab. praesertim in praecipitibus saxosis fluminis *Mississipi* et ripariis Illinoensibus.

Authors immediately following Michaux seem not to have known the plant, Beauvois shifting it without discussion to *Vilfa*, and Kunth, likewise with no discussion, transferring it to *Cinna*. It was not until Kunth's *Enumeratio* that the plant, as *Cinna lateriflora* (Michx.) Kunth, with "*Muehlenbergia lateriflora Trin.*" as a synonym, was again accorded a diagnosis, that copied directly from Michaux. Michaux's erect culm, densely flowered small panicles and muticous glumes are not satisfactory for the common plant known as *M. mexicana*. The photograph is of mere fragments: broken-off tips of a stiffly ascending plant with long internodes; leaf-blades erect, only 2–4 mm. broad and long-tapering; the linear-filiform panicles only 1.5–4 mm. thick, with spikelets only 2.5–3 mm. long. These fragments look like small bits picked from a plant of *M. glabriflora* Scribn. Only Michaux's "glumae . . . interioribus . . . basi barbulatis" would seem to separate it from that species of dry or baked soils, gravels or rocky slopes, from southwestern Indiana (perhaps also Ohio) and Illinois to Texas. *M. glabriflora* is reputed to have the lemma glabrous. It would not now be justifiable to reduce *M. glabriflora* to *M. lateriflora*; when the florets can be actually studied that may be inevitable. In fact, Steudel, *Synop. Pl. Gram.* 182 (1854), describing in detail the species he took to be *Cinna lateriflora* (Michx.) Kunth, from Ohio plants of Frank's, said "glumis . . . subaequalibus . . . ; valvulis . . . glabris." It is, however, fairly clear that we can not properly take up *M. lateriflora* for the plant, no. 1, which has been passing as *M. mexicana*.

Another name, ignored or waved aside by recent American authors, needs consideration, for it is with little doubt the first name for species no. 1, the plant generally passing as *Muhlenbergia mexicana* and so passing for more than a century, the confusion dating back to botanists of a full century ago, when

nos. 1 and 2 were completely mixed in our floras, Torrey, Fl. N. Y. ii. 437, 438 (1843), for instance, saying "*M. foliosa* Trin. (*Agrostis filiformis*, Muhl. gram.) seems to be only a variety of this species", in which, unintentionally perhaps, he was correct, for, as I later show, the type of *Agrostis filiformis* is the form of true *M. mexicana* with awned lemmas. The species (*M. mexicana* sensu Torrey) with "Culm . . . much branched . . . often geniculate; sheaths compressed, loose . . . is sometimes troublesome in gardens", the latter points applying to species no. 1. The neglected name to which I refer is *Agrostis frondosa* Poir. in Lam. Encyc. Suppl. i. 252 (1790). The description, noting *flexuous stems, very leafy and compressed branches, purplish nodes, loose sheaths* and oblong and often purplish panicles suggesting those of *A. mexicana*, are all indicative of species no. 1. Here is Poiret's account, he giving the name because of the leafiness of the plant:

46. AGROSTIS feuillé *Agrostis frondosa*.

Agrostis culmo flexuoso, articulis ramosis, foliosis; paniculis coarctatis; calicibus acutis, corollâ brevioribus. (N.)

Ses tiges sont hautes d'un à deux pieds, glabres, un peu flexueuses à leurs articulations: de chacune de ces articulations il sort des rameaux feuillés, comprimés, également flexueux, & souvent de couleur purpurine au dessous des noeuds. Les feuilles sont glabres, courtes, nombreuses; leur gaine lâche, nue à son orifice, munie d'une petite membrane blanche. Les panicules sont étroites, serrées, assez semblables à celles de l'*agrostis mexicana*; les ramifications en forme d'épis oblongs, de couleur verte, un peu purpurine; les fleurs petites, oblongues; les valves calicinales plus courtes que celles de la corolle, aiguës, mucronées à leur sommet; celles de la corolle étroites, oblongues, aiguës.

Cette plante croît en Allemagne. (*V. s. in herb. Desfont.*)

Although it was supposed that *Agrostis frondosa* came from Germany, the name was completely disregarded in the great German floras of Gmelin, Koch and others of their period; nor does it have any recognition in the more modern and voluminous treatments by Ascherson & Graebner and by Hegi. The source, like that of so many species early reaching European collections, was evidently misunderstood, as was that of *A. mexicana* of Linnaeus, Jacquin and others. Nevertheless, the weedy tendency of species no. 1 evidently enabled it to reach Europe somewhat after Poiret's time. For instance, Lejeune & Courtois, Comp. Fl. Belg. i. 61 (1828) refer to *A. "mexicana"* having been collected in Belgium, "e semine exotico orta"; and Hegi, Ill. Fl.

Mittel-Eur. vii. 154 (1931), refers to the recent occurrence in Germany of *M. mexicana*. Whether these are true *M. mexicana* (“*foliosa*”) or the very different plant (our no. 1) which generally passes as *M. mexicana* I can not now determine.

But, returning to *Agrostis frondosa* Poir. Roemer & Schultes, Syst. ii. 373 (1817) made it an exact synonym of their newly defined *A. foliosa*, saying “certissime huc spectat”. Steudel, who certainly understood grasses, treated it unequivocally in his Nomenclator, ed. 2: 365 (1840) as identical with various plants now placed under *Muhlenbergia* (including *M. foliosa*, etc., but not *M. mexicana*, which Steudel retained in the true sense). Hooker filius & Jackson in Index Kewensis, placed it, also without question, in the all-inclusive *M. mexicana* of their period. As already noted, Poiret’s “culmo flexuoso . . . de chacune de ces articulations il sort des rameux feuillés, comprimés, également flexueux . . . Les feuilles . . . nombreuses; leur gaine lâche, . . . Les panicules . . . les ramifications en forme d’épis oblongs” are reasonably good characterizations of our common so-called *M. mexicana*; no other species involved in the problem has *lax* and *compressed* sheaths. I am, therefore, subject to verification when the type can be studied, identifying *M. mexicana* of recent authors with AGROSTIS FRONDOSA Poiret.

The name *Muhlenbergia foliosa* (Roemer & Schultes) Trin. Gram. Unifl. 196 (1824) rests for typification upon *Agrostis foliosa* Roem. & Schultes, Syst. Veg. ii. 373 (1817). As currently treated *M. foliosa* is an erect plant with few erect branches; scabrous-puberulent internodes; firm ascending leaves; “panicles mostly exserted, often rather long-exserted, narrow, of numerous short appressed densely flowered somewhat aggregate branches” (*Hitchcock*), the branches densely flowered to base; the spikelets sessile or short-pedicelled; glumes subequal and subulate-tipped (only rarely definitely awned), firm and herbaceous; the usually awnless lemma of similar texture; the mature florets tardily dropping and tightly embracing the slenderly ellipsoid grain (1.3–1.6 mm. long), the plant, my no. 2, which I identify with *M. mexicana* in the strict sense. Roemer & Schultes evidently supposed that Poiret’s *Agrostis frondosa* was the plant in cultivation under the equivalent name, *A. foliosa*, and their glumes unequal, with hispid awns (“calycibus inaequalibus aris-

tatis hispidis") might well have been derived from *A. frondosa*; but their lemma and palea unequal, the former awned at tip and the culm much branched, erect ("corollis . . . inaequalibus valvulâ majore apice aristata, culmo ramosissimo erecto") suggest *M. sylvatica*! Roemer & Schultes had two varieties: "α. paniculis viridibus" to which they assigned *A. filiformis* Willd.; and "β. paniculis rubicundis" to which they assigned *A. frondosa* Poir. The latter has already been discussed.

The two subdivisions of their *Agrostis foliosa* were borrowed in part from Willdenow, who had described, also from cultivated plants, *A. filiformis* Willd. Hort. Bot. Berol. i. 95 (1809); but without including in it *A. frondosa* Poir.

*6. AGROSTIS *filiformis*.

A. panicula coarctata subspicata, calycibus aristatis inaequalibus hispidis, corollis calyce majoribus inaequalibus valvula majore apice aristata, culmo ramosissimo erecto.

α. paniculis viridibus.

β. paniculis rubicundis.

Agrostis foliosa Hortulanorum.

Habitat in America boreali. ♀. D.

A Polypogone diversa calycibus corolla brevioribus. Habitu accedit ad *A. mexicanam*, sed calycibus, corollis, inflorescentia tenuiore, et florescentia serotina diversa. Varietas β robustior.

A photograph of Willdenow's type of *Agrostis filiformis*, most kindly presented to me by Professor Diels, shows the slenderest extreme of *Muhlenbergia mexicana*, the plant usually passing as *A. foliosa*; but the awns at the tips of the lemmas show that it is the form known as *A. foliosa*, forma *ambigua* (Torr.) Wieg. The exact identity of the plants of Roemer & Schultes must await opportunity to study them. In the mean time, however, the very liberal fragments of what was taken as the type of Roemer & Schultes have been sent me from the National Herbarium at Washington for study. Portions of this material are reproduced as PLATE 749, FIGS. 1, 2 and 3. They certainly belong to the species which has erroneously passed as *M. mexicana*; and since the name *Agrostis foliosa* Roemer & Schultes was nomenclaturally a substitute for *A. frondosa* Poir. and, therefore, illegitimate, it is fortunate that the Roemer & Schultes type belongs so unequivocally to the species which I take to be *A. frondosa* of Poiret.

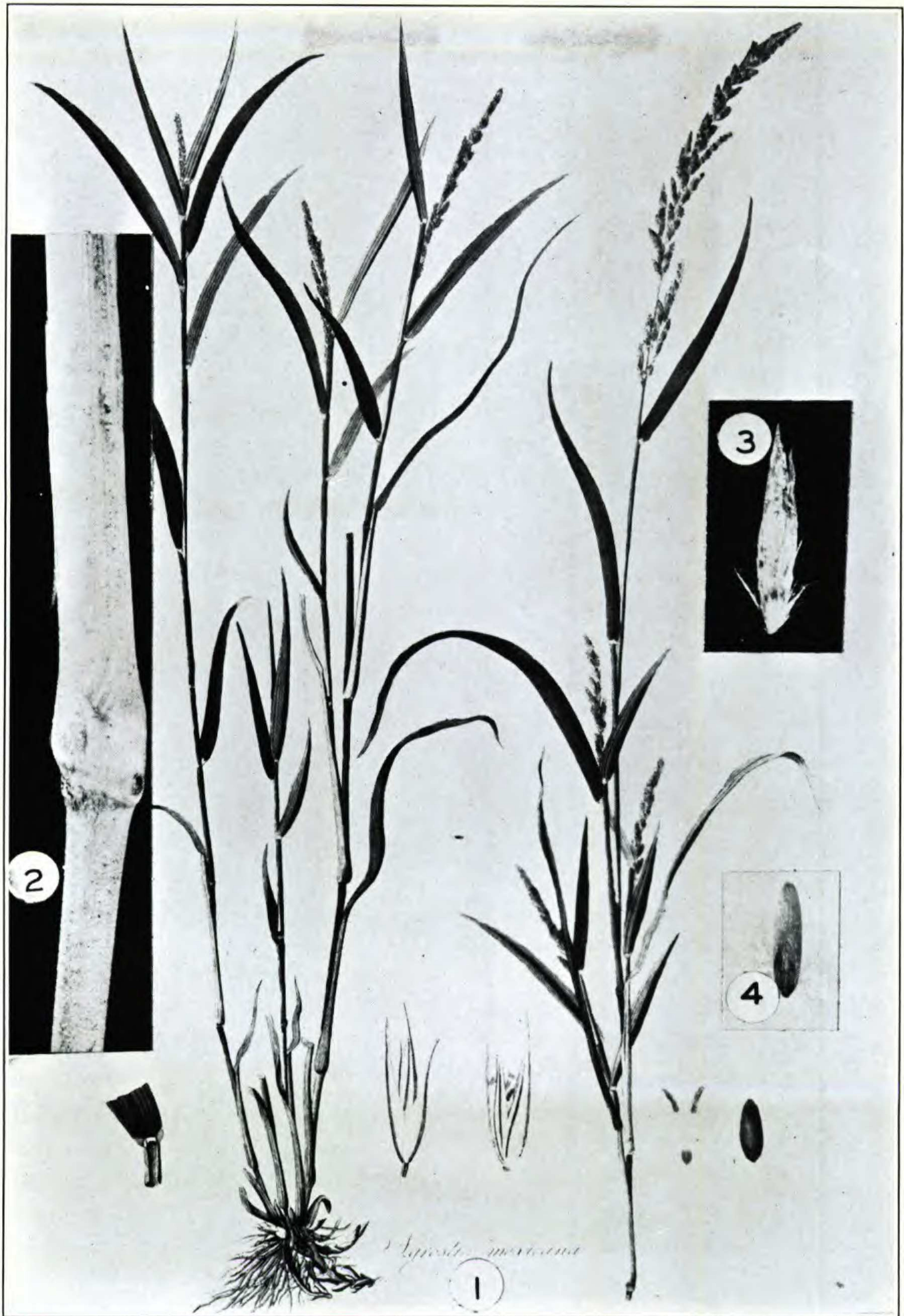


Photo. B. G. Schubert.

MUHLENBERGIA MEXICANA: FIG. 1, Jacquin's plate of AGROSTIS MEXICANA, $\times \frac{2}{5}$; FIG. 2, summit of puberulent and opaque internode and node and base of sheath, $\times 5$, from Massachusetts; FIG. 3, floret, $\times 10$, from Quebec; FIG. 4, grain, $\times 10$, from New Jersey.

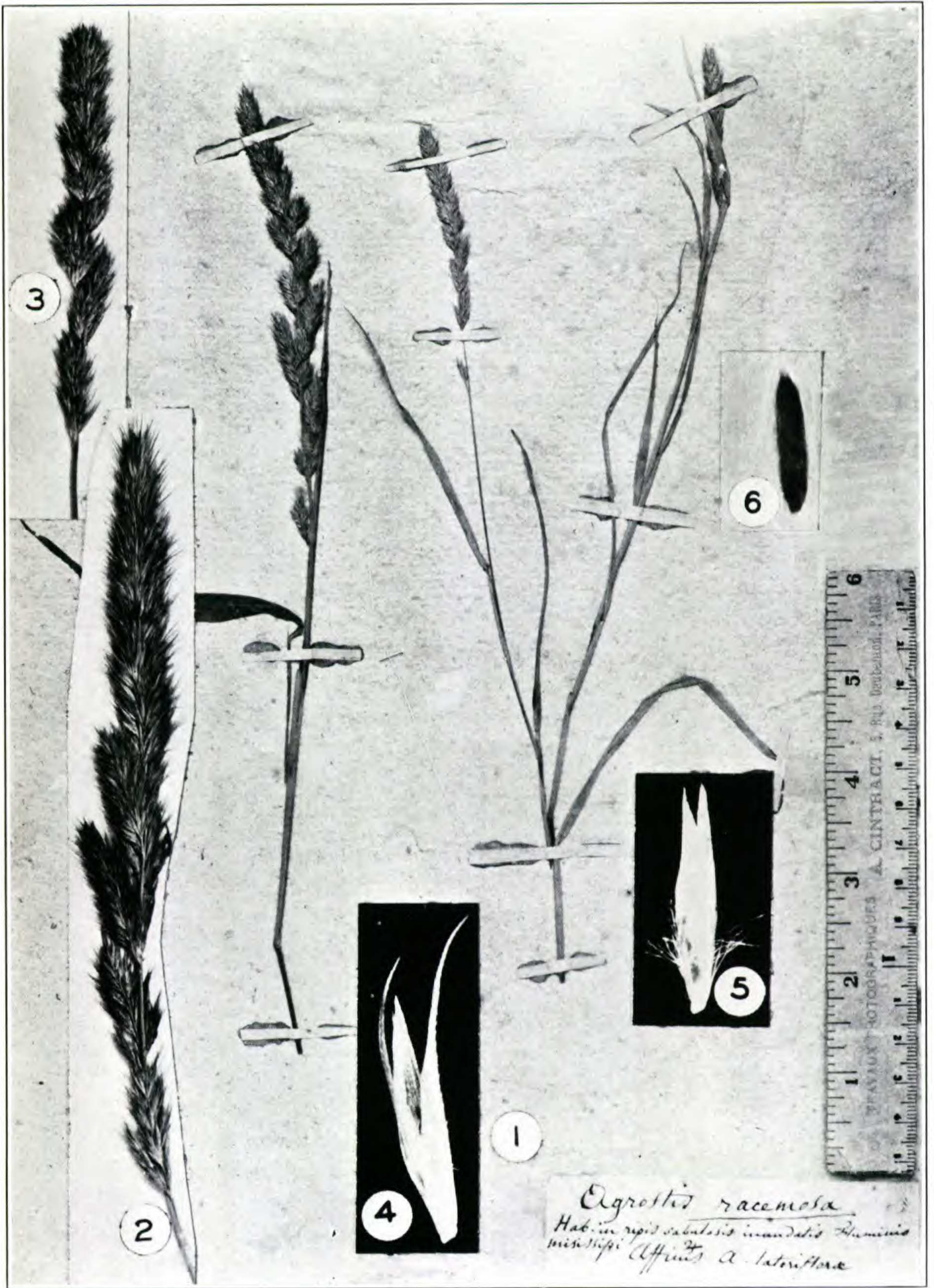


Photo. B. G. Schubert.

MUHLENBERGIA RACEMOSA: FIG. 1 (2 branches), type of *Agrostis racemosa*, $\times \frac{1}{2}$; FIG. 2, panicle, $\times 1$, from Illinois; FIG. 3, panicle, $\times 1$, from Illinois; FIG. 4, spikelet, $\times 10$, from Minnesota; FIG. 5, floret, $\times 10$, from Minnesota; FIG. 6, grain, $\times 10$, from Illinois.

M. SYLVATICA

MUHLENBERGIA SYLVATICA TORR. IS, APPARENTLY, CORRECTLY UNDERSTOOD! A northeastern variety of it will be published on a succeeding page.

M. RACEMOSA (PLATES 753 and 754)

Muhlenbergia racemosa (Michx.) BSP., on the other hand, has been quite misinterpreted. This misinterpretation arose through the fact that most specimens reaching the European herbaria and the plant best known to botanists of Cambridge, New York and Washington is the very different *M. setosa* (Spreng.) Trin., with erect, slender and usually simple culms with scabrous-puberulent internodes, typical of bogs, wet meadows and shores and doubtless suggesting to the manufacturer of "English" names the pseudonym "Marsh Muhly", commented upon on p. 222. *Agrostis racemosa* Michx., basis of the very recent and by its authors not understood combination *M. racemosa* (Michx.) BSP. Prelim. Cat. N. Y. 67 (1888), "Presumably based on *Agrostis racemosa* Michx." (*Hitchcock*), is a wholly different species of the interior of the continent and almost unknown in herbaria prior to 1850. It was finally recognized as *M. glomerata*, var. *ramosa* Vasey, Descr. Cat. Grasses U. S. 40 (1886) but Vasey did not see the really distinctive characters.

Muhlenbergia setosa (or *glomerata*) has the culms unbranched or with few erect basal branches; opaque and scabrous-puberulent internodes; leaf-sheath with rounded midrib and minute usually hidden ligule; conspicuous anthers 1–1.5 mm. long; oblong-cylindric grain easily freed and 1.2–1.5 mm. long; the species with transcontinental boreal range and intrusions southward, east and west, in paludal habitats. *M. racemosa*, on the other hand, is a plant of the dry interior, often "in the driest of soil", with culms usually stiffly branched at the middle nodes; the internodes lustrous and glabrous; the leaf-sheath keeled; the ligule prolonged; the anthers only 0.5–0.8 mm. long; the tightly embraced linear-cylindric grain 1.8–2.2 mm. long.

Michaux's original description was too general to note any of the specific points, and his habitat, "in ripis sabulosis inundatis fluminis *Mississippi*" inconclusive. The photograph of the type before me shows, however, the high-branching culm and the

characteristic stiffly glomerulate-spiciform panicles of *M. glomerata*, var. *ramosa*; and examination by me of the Michaux specimens in 1930 revealed the glabrous internodes and tiny anthers. The name *Muhlenbergia racemosa* (Michx.) BSP. should be restricted to the plant of the interior later described as *M. glomerata*, var. *ramosa*.

M. SETOSA (PLATES 755-757)

Muhlenbergia glomerata (Willd.) Trin. Gram. Unifl. 191, pl. 5, fig. 10 (1824) rests upon *Polypogon glomeratus* Willd. Enum. Pl. 87 (1809), which was described in great detail, the simple diagnosis and accompanying statements being

*2. POLYPOGON *glomeratus*.

P. panicula glomerata subspicata, calycibus subulatis scabris, culmo adscendente basi ramoso.

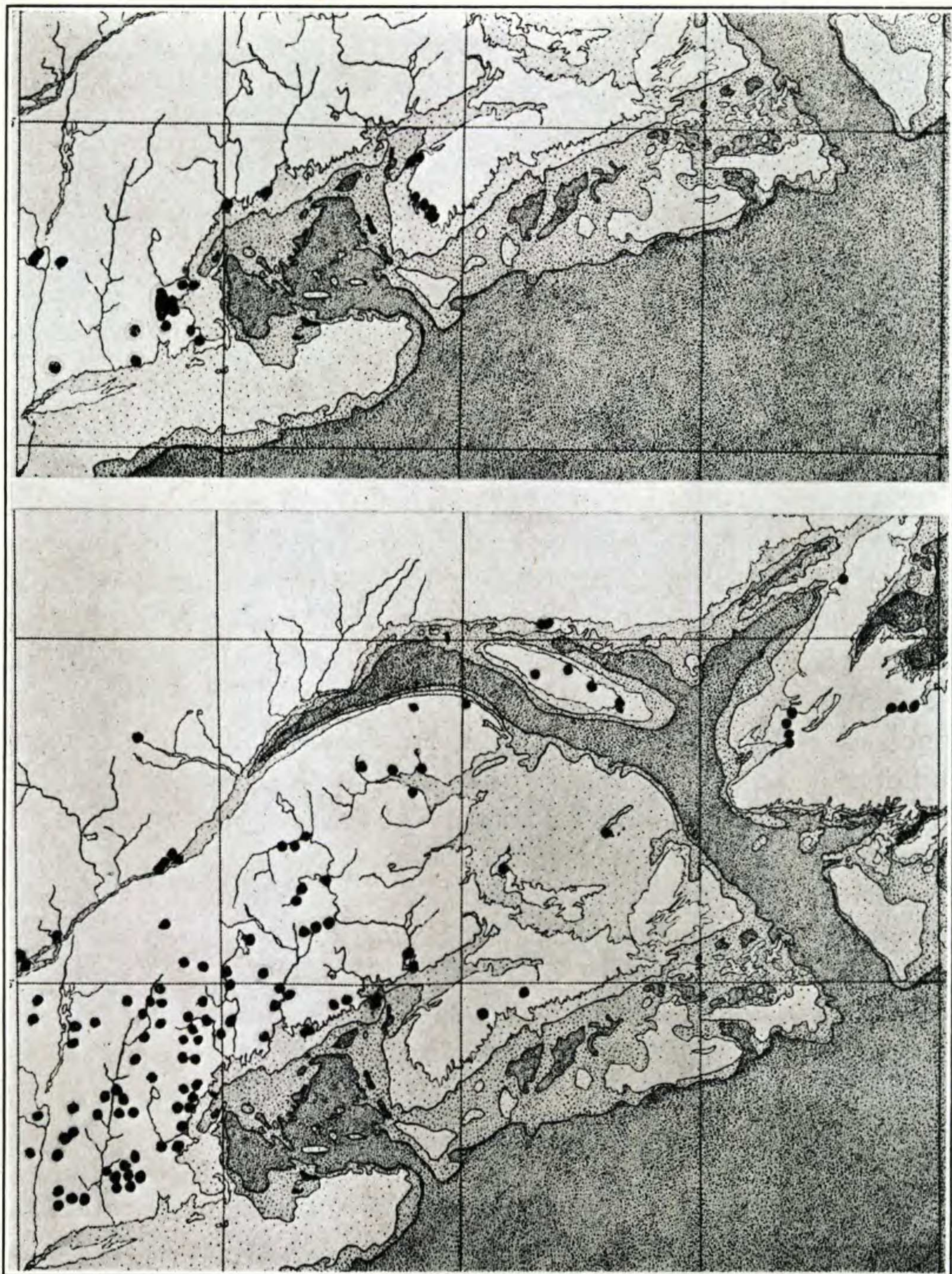
Agrostis festucoides Mühlenberg *in litt.*

Habitat in America boreali 2. D.

Since the plant was received from Muhlenberg, it presumably came from eastern Pennsylvania. The very long description following the diagnosis may be abbreviated.

“*Folia* rigidiuscula . . . *Ligula* brevissima . . . *Vaginae* foliorum solutae. *Panicula* glomerato-spicata obtusiuscula, ramis brevissimis adpressis flexuosis . . . *Calyx* . . . aristatus corolla longior, nervo medio viridi, una cum arista scabro . . . Basis corollae pilis aliquot est instructa . . . Habitu accedit quodammodo ad *Agrostidem* mexicanam, sed recedit ab hoc genere calyce aristato, et est vera *Polypogonis* species.”

The type, for a photograph (our PLATE 756, FIG. 1) of which I am indebted to Professor Diels, consists of four plants of the characteristic species (MAP 1) growing in bogs and wet meadows from western Nova Scotia and southern Maine to southern Ontario and Michigan, south to southern New England, northern New Jersey, Pennsylvania, mountains to North Carolina, and Indiana. There is no question about the identity of *Muhlenbergia glomerata*; but a second plant (MAP 2), also of simple habit or branched usually from the base, with puberulent internodes, large anthers and short grains, occurs farther north, from Newfoundland to Alberta, south to Nova Scotia and Maine, northern Massachusetts, Connecticut, New York, central Pennsylvania, Ohio, Michigan, Wisconsin, Minnesota, Wyoming, Nevada and Oregon. This is *Dactyloctenium aegyptium* Link, Hort. Berol. ii.



MAP 1 (upper), eastern Range of MUHLENBERGIA SETOSA; MAP 2 (lower), of M. SETOSA, var. CINNOIDES.

248 (1833), described in great detail from plants raised from seed from northwestern Canada sent by Dr. John Richardson. The genus *Dactylogramma* Link was based on this material, Link separating it from *Cinna*. From the very full description the following points are drawn:

“Caulis erectus parum ramosus . . . Panicula tenuis glomerata. Valvae subaequales longissime acutatae quasi aristatae, glumella longiores. Valvulae . . . pilis longis adpressis ad marginem . . . Caulis sub terra repens, 2–3 pedes altus . . . inferne pilis brevissimis pubescens . . . ligula brevis truncata. Panicula 2–4 poll. longa, ramis subdistantibus brevissimis superne approximatis, ramulis conglomeratis.”

The description is vivid; the photograph (our PLATE 757, FIG. 1) of Link's type sent me by Professor Diels unequivocal.

The more northern *Dactylogramma cinnoides* differs in several characters from the relatively southern *Muhlenbergia glomerata*. In the latter the flowering culms bear 7–15 leaves, many of them often crowded and overlapping at the middle nodes; in the former there are 5–8 (rarely –10) more scattered leaves. In *M. glomerata* the panicle, as correctly defined by Willdenow, has round-tipped spikes mostly crowded to form a subcontinuous lobulate-spiciform inflorescence; in *D. cinnoides* the spikes or branches, except the upper, are more scattered or subdistant and less rounded at summit. In *M. glomerata* the inflorescence is often purplish, sometimes green; in *D. cinnoides* green, though sometimes purplish. The panicle of *M. glomerata* has a misty appearance, the awns and glumes not sharply visible. This comes from the copiously hispid keels and awns. In *D. cinnoides* the panicle has the glumes and awns more clearly visible, the keels and awns being merely scabrous with definitely shorter trichomes. These differences, with no appreciable difference in anthers and grains, seem to me varietal, rather than specific, and I am treating *D. cinnoides* as a northern geographic variety of the more southern plant.

Unfortunately, however, there is an earlier valid specific name for true *Muhlenbergia glomerata* (Willd.) Trin., which was based on *Polypogon glomeratus* Willd. (1809). This is *Polypogon setosus* Spreng. Mant. Fl. Hal. 31 (1807). That it is specifically identical with the Muhlenberg material which formed the basis of Willdenow's species is clear from the description; the photo-

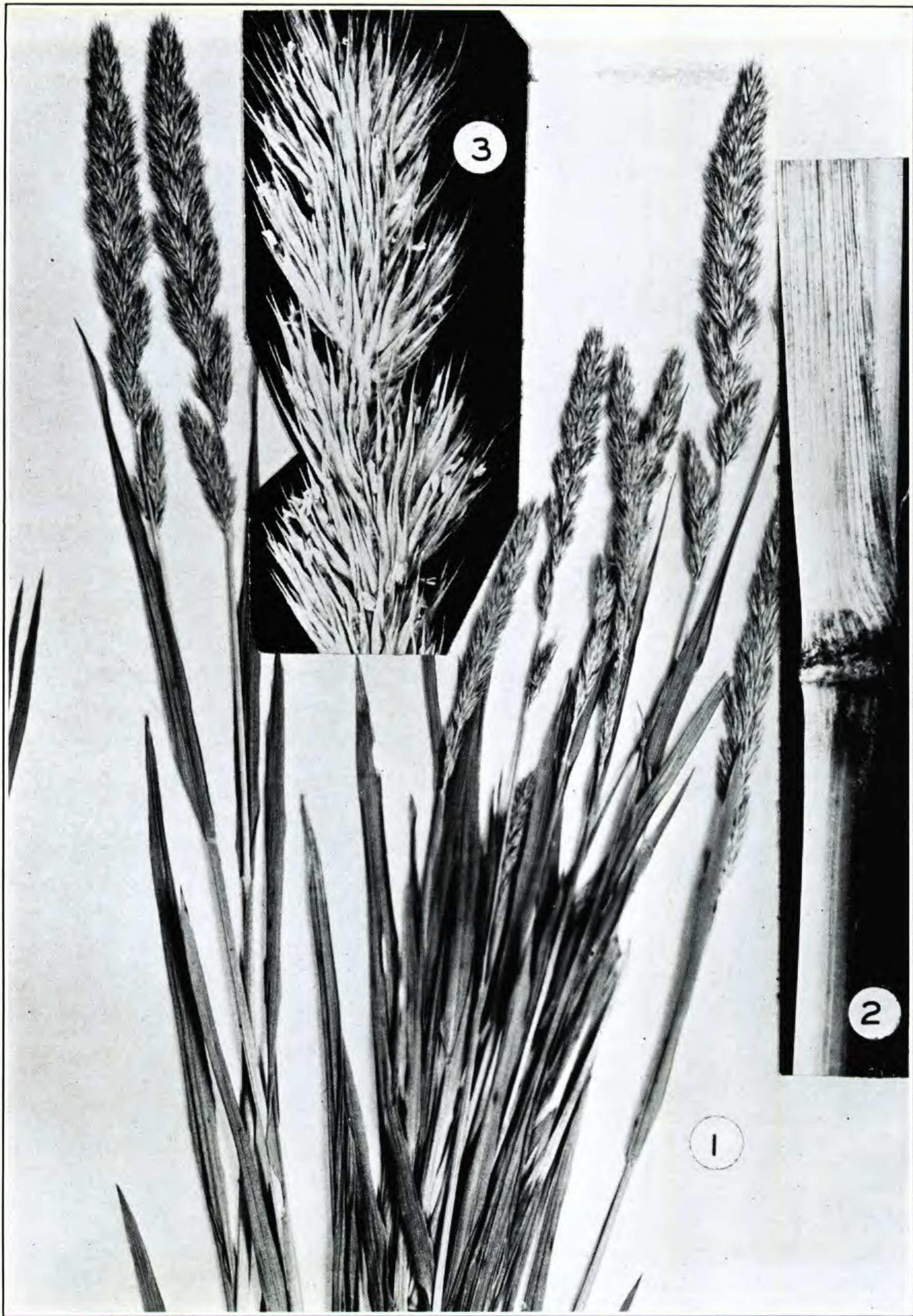


Photo. B. G. Schubert.

MUHLENBERGIA RACEMOSA: FIG. 1, characteristic summit of plant, $\times 1$, from Minnesota; FIG. 2, summit of glabrous and lustrous internode and node and base of sheath, $\times 5$, from Wisconsin; FIG. 3, portion of panicle to show characteristic small anthers, $\times 4$, from Illinois.

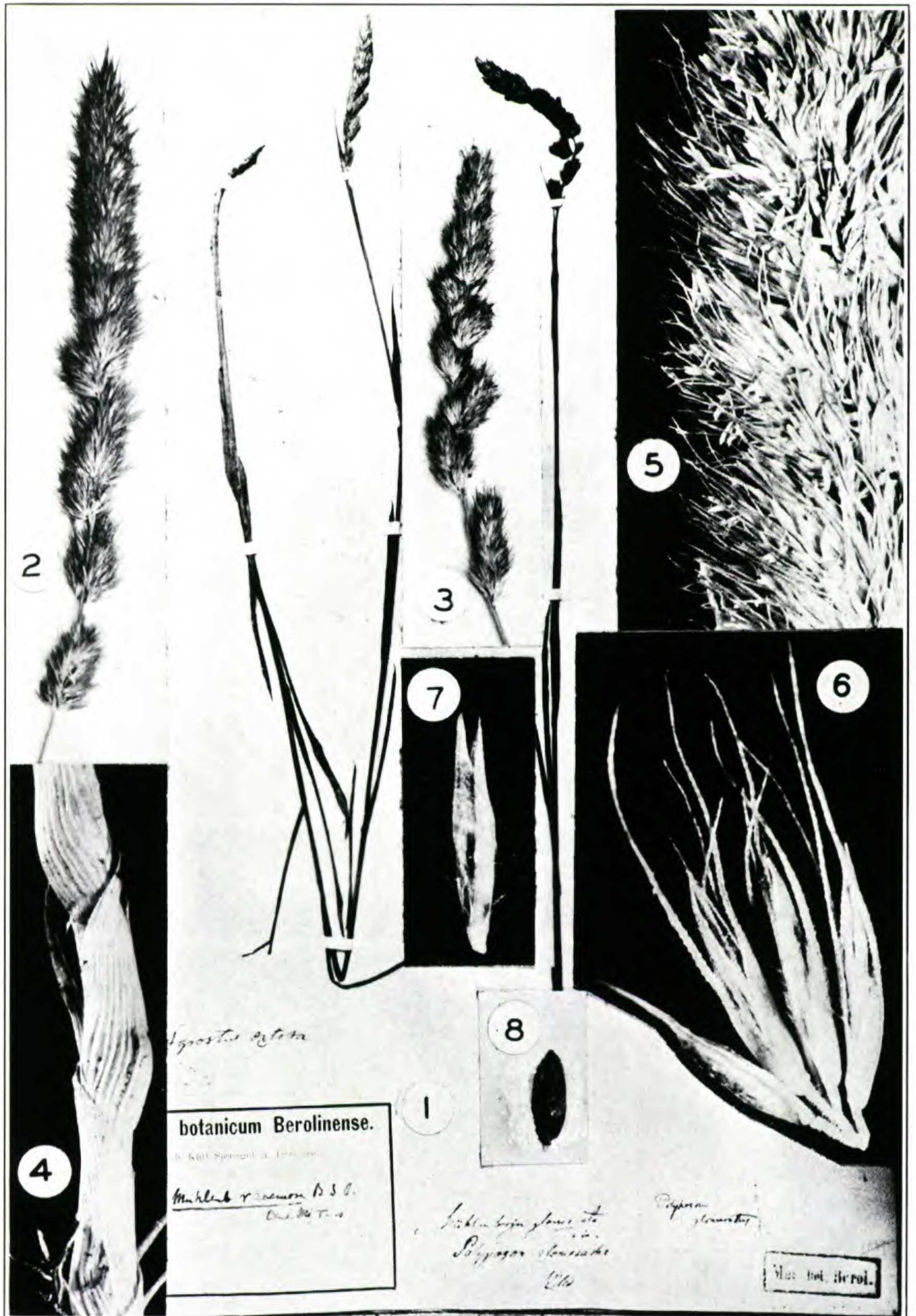


Photo. B. G. Schubert.

MUHLENBERGIA SETOSA: FIG. 1, type of POLYPOGON SETOSUS, $\times \frac{1}{3}$; FIG. 2, panicle, $\times 1$, from Massachusetts; FIG. 3, panicle, $\times 1$, from Pennsylvania; FIG. 4, portion of rhizome, $\times 4$, from Nova Scotia; FIG. 5, portion of panicle to show characteristic long anthers, $\times 4$, from Massachusetts; FIG. 6, spikelets, $\times 10$, from Massachusetts; floret showing basal villi, $\times 10$, from Pennsylvania; FIG. 8, grain, $\times 10$, from Pennsylvania.

graph of Sprengel's type (our PLATE 755, FIG. 1), for which I am also indebted to Professor Diels, is certainly of the plant of eastern Pennsylvania. Sprengel's description was to the point:

9. POLYPOGON SETOSUS, panicula spicaeformi, glumis acuminatis aristatis scabris, foliis involutis rigidis.

Culmus teres, glaber, foliosus, pedalis. *Folia* glabra, vaginantia, involuta, rigida. *Panicula* terminalis, parumper ex ultimo folio emergens, fusca, densè spicaeformis, ramulis glomeratis contractis. *Gluma* calycina valvulis acuminatis scabris aristatis, uniflora, corolla paullo maior. *Gluma* corallina valvulis acuminatis muticis.

E Pennsylvania. *Muhlenb.*

In his *De Graminibus Unifloris et Sesquifloris*, 195 (1824), after properly transferring several species to *Muhlenbergia*, Trinius took a short cut and merely stated that certain species belonged to that genus: "Ad sectionem *a* (*Muhlenbergiam*) pertinent: . . . Polypogon setosus *Spreng.*", but the combination, ascribed to Trinius at this place and with the correct synonym, *M. glomerata*, was made in *Index Kewensis*. The species with culms simple or sparingly branched at base and with scabrous-puberulent internodes, large anthers and small grains is, then, *M. SETOSA* (Spreng.) Trin. ex Hook. f. & Jackson, Ind. Kew. ii. 209 (1894).

Summarizing this rather verbose but seemingly necessary discussion, the five species of *Muhlenbergia* specially considered resolve themselves as follows (omitting *M. sylvatica* which, except for the designation of a variety, is unchanged). In order to clarify the complex questions I am reproducing photographs of types in so far as they are before me and sufficiently clear for reproduction. These I am supplementing by some of Dr. Bernice G. Schubert's very clear enlargements of pertinent details.

MUHLENBERGIA frondosa (Poir.), comb. nov. *Agrostis frondosa* Poir. in *Lam. Encyc. Suppl.* i. 252 (1790). *A. foliosa* Roem. & Schultes, *Syst.* ii. 373 (1817), substitute-name for *A. frondosa*. *M. foliosa* (Roem. & Schultes) Trin. *Gram. Unifl.* 196 (1824), not recent auth. *M. mexicana* sensu most recent auth., not (L.) Trin.—For diagnostic characters see no. 1 in key. PLATES 749 and 750.

M. FRONDOSA, forma **commutata** (Scribn.), comb. nov. *M. mexicana commutata* (as subsp.) Scribn. in *RHODORA*, ix. 18 (1907), at least as to TYPE, *Fernald*, no. 522, designated by Hitchc. *Man.* 890 (1935), where Scribner's trinomial "n. subsp." is cited as "var." *M. mexicana*, var. *commutata* (Scribn.) Farwell in *Rep. Mich. Acad. Sci.* xvii. 181 (1916). *M. commutata*

(Scribn.) Bush in Am. Midl. Nat. vi. 61 (1919). *M. mexicana*, forma *commutata* (Scribn.) Wiegand in RHODORA, xxvi. 1 (1924).

M. MEXICANA (L.) Trin. Gram. Unifl. 189 (1824). *Agrostis mexicana* L. Mant. i. 31 (1767); Jacq. f. Eclog. Pl. Rar.-Gram. Fasc. ter. et quart. 44, t. 30 (1813). For other synonyms based on *A. mexicana* see Hitchcock. *M. foliosa* sensu most recent auth., not (R. & S.) Trin. For diagnostic characters see no. 2 in key. PLATES 751 and 752.

M. MEXICANA forma **ambigua** (Torr.), comb. nov. *Agrostis filiformis* Willd. Enum. i. 95 (1809). *Cinna filiformis* (Willd.) Link, Enum. i. 70 (1821). *Agrostis lateriflora*, var. *filiformis* (Willd.) Torr. Fl. N. Mid. U. S. 86 (1823). *M. ambigua* Torr. in Nicolle, Rep. Miss. 164 (1843). *M. mexicana filiformis* (Willd.) Scribn. in Mem. Torr. Bot. Cl. v. 36 (1894). *M. foliosa ambigua* (Torr.) Scribn. in RHODORA ix. 20 (1907). *M. ambigua*, var. *filiformis* (Willd.) Farwell in Mich. Acad. Sci. Rep. xx. 168 (1919). *M. foliosa*, forma *ambigua* (Torr.) Wiegand in RHODORA, xxvi. 1 (1924).

M. MEXICANA, forma **setiglumis** (S. Wats.), comb. nov. *M. sylvatica*, var. *setiglumis* S. Wats. in King, Geol. Expl. 40th Paral. v. 378 (1871). *M. foliosa setiglumis* (S. Wats.) Scribn. in RHODORA, ix. 20 (1907). *M. setiglumis* (S. Wats.) Nels. & Macbr. in Bot. Gaz. lxi. 30 (1916).

M. SYLVATICA Torr., var. **robusta**, var. nov., culmis rigidis arcte adscendentibus; foliis firmis ad 5–9 mm. latis; paniculis densioribus; glumis late lanceolatis vel lanceolato-ovatis; lemmatibus 3–4 mm. longis longe aristatis; antheris 0.5–0.7 mm. longis; caryopsibus 1.9–2.1 mm. longis.—Open woods and thickets, central Maine to western New York and eastern Pennsylvania. The following are characteristic. MAINE: Austin Stream, Moscow, August 27, 1902, Collins & Chamberlain; Sydney, August 18, 1916, Fernald & Long, no. 12,597 (TYPE in Herb. Gray). NEW HAMPSHIRE: by Merrimac River below Bedford, August 27, 1931, Fernald & Griscom, no. 2495; Gilsum, August 9, 1899, Fernald, no. 287; Wilton, August 15, 1916, C. F. Batchelder. VERMONT: Grand Isle, July 24, 1935, Knowlton. MASSACHUSETTS: Needham, August 31, 1884, T. O. Fuller; Blue Hills Reservation, September 22, 1895, E. F. Williams; Huntington, August 17, 1912, Robinson, no. 358. RHODE ISLAND: Lincoln, October 2, 1910, E. F. Williams. CONNECTICUT: Sprague, September 1, 1905, Woodward; Reynold's Bridge, September 4, 1910, Blewitt; Bridgeport, September 22, 1896, Eames. NEW YORK: Starbuckville, August 26, 1932, Muenscher & Lindsey, no. 2954; Genoa, August 21, 1918, Wiegand, no. 9185; Ithaca, September 5, 1916, F. P. Metcalf, no. 5613; Butler, October 5, 1916, Metcalf & Wright, no. 5614. PENNSYLVANIA: Wayne, October 15, 1910, Bartram, no. 1313.

Typical *Muhlenbergia sylvatica* has relatively weak and loosely ascending culms; the leaves subflaccid, the larger ones 2–7 mm. wide; the panicle very loose; the glumes linear-lanceolate to linear-attenuate, the 2d about equaling to slightly exceeding the blade of the lemma, the latter 2.3–3 mm. long; the anthers 0.3–0.6 mm. long; the mature grain nearly or quite free, 1.4–1.8 mm. long. It is widely distributed, from southwestern Quebec to Minnesota, south to North Carolina, Alabama, Arkansas and northeastern Texas.

Var. *robusta* is stiffer and larger in all parts. Its leaves are firm and more ascending, the larger ones 5–9 mm. broad; the panicle fuller; glumes broadly lanceolate to lance-ovate, shorter than the blade of the lemma, the latter 3–4 mm. long; anthers 0.5–0.7 mm. long; grain more firmly embraced and 1.9–2.1 mm. long.

M. RACEMOSA (Michx.) BSP. Prelim. Cat. N. Y. 67 (1888), by inference. *Agrostis racemosa* Michx. Fl. Bor.-Am. i. 53 (1803). *Polypogon racemosus* (Michx.) Nutt. Gen. i. 51 (1818). *Cinna racemosa* (Michx.) Kunth, Rév. Gram. i. 67 (1829). *M. glomerata*, var. *ramosa* Vasey, Descr. Cat. Grasses U. S. 40 (1885). *M. racemosa*, var. *ramosa* Vasey in Beal, Grasses N. Am. ii. 253 (1896). For diagnostic characters see no. 4 in key. PLATES 753 and 754.

M. SETOSA (Spreng.) Trin. ex Hook. fil. & Jackson, Ind. Kew. iii. 209 (1894). *Polypogon setosus* Spreng. Mant. Fl. Hal. 31 (1807). *P. glomeratus* Willd. Enum. 87 (1809). *Alopecurus glomeratus* (Willd.) Poir. in Lam. Encycl. v. 495 (1817). *Agrostis setosa* (Spreng.) Muhl. Descr. Gram. 68 (1817). *Trichochloa glomerata* Trin. Fund. Agrost. 117 (1820). *T. calycina* Trin. l. c. (1820). *M. glomerata* (Willd.) Trin. Gram. Unifl. 191, pl. 5, fig. 10 (1824). *M. calycina* Trin. l. c. 193 (1824). *Podosaemum glomeratum* (Willd.) Link, Hort. Berol. i. 84 (1827). *Cinna glomerata* (Willd.) Link, l. c. ii. 237 (1833). For specific characters see no. 5 in key.—Typical *M. setosa* has the leaves of flowering culms 7–15, many of them often browded and overlapping at the middle nodes; panicle purplish, fuscous or green, with all but the lowest of the densely flowered ellipsoid to rounded-obovoid branches closely crowded, the panicle thus appearing densely lobulate-spiciform; keel and awns of glumes copiously hispid, thus giving the inflorescence a “misty” aspect.—Meadows, bogs and wet shores, western Nova Scotia and southern Maine to southern Ontario and Michigan, south to southern New England, northern New Jersey, Pennsylvania, mountains to North Carolina, and Indiana. PLATES 755 and 756; MAP 1.

Var. **cinnoides** (Link), comb. nov. *Dactylogramma cinnoides* Link, Enum. Hort. Berol. ii. 248 (1833).—Differing from typical *M. setosa* in having fewer (5–8, rarely –10) and usually more scattered leaves; panicle usually green, rarely purple-tinged, usually more interrupted, the cylindric to oblong-ovoid often subacute lower branches often remote; glumes slightly broader, with merely scabrous keel and awn (the panicle, therefore, not appearing “misty”).—Similar habitats, Newfoundland to Alberta, south to Nova Scotia, northern Massachusetts, Connecticut, New York, central Pennsylvania, Michigan, Wisconsin, Minnesota, Wyoming, Nevada and Oregon. PLATE 757; MAP 2.

PLATE 749. MUHLENBERGIA FRONDOSA (Poir.) Fern.: FIGS. 1, 2 and 3, fragments from TYPE of *Agrostis foliosa* Roem. & Schultes, $\times 5$, from portions of type in Herb. U. S. Nat. Mus., kindness of Mr. Jason R. Swallen; FIG. 4, two spikelets, $\times 4$, from Bridgeport, Connecticut, September 7, 1893, Eames; FIG. 5, floret, $\times 10$, from Shirley, Massachusetts, October 4, 1914, J. R. Churchill; FIG. 6, grain, $\times 10$, from last specimen.

PLATE 750. MUHLENBERGIA FRONDOSA (Poir.) Fern.: FIG. 1, a characteristic decumbent branch, $\times \frac{1}{3}$, from East Jaffrey, New Hampshire, B. L. Robinson, no. 395; FIG. 2, characteristic glabrous internode, open and compressed sheaths and partly included axillary panicle, $\times 5$, from Stratford, New Hampshire, Pease, no. 23,921; FIG. 3, portion of rhizome, $\times 4$, to show cucullate-arching scales, from no. 23,921.

PLATE 751. MUHLENBERGIA MEXICANA (L.) Trin.: FIG. 1, TYPE of AGROSTIS MEXICANA L., basis of the species, $\times \frac{1}{2}$, from Herb. Linn., kindness of the late Dr. B. Daydon Jackson; FIG. 2, portion of panicle of TYPE, $\times 5$, from fragment in Herb. U. S. Nat. Mus., kindness of Mr. Jason R. Swallen; FIG. 3, two spikelets, $\times 10$, from Lanoraie, Quebec, Victorin & Rolland, no. 29,030.

PLATE 752. MUHLENBERGIA MEXICANA (L.) Trin.: FIG. 1, plate of Jacquini f., $\times \frac{2}{5}$; FIG. 2, portion of opaque and puberulent internode and node and base of sheath, $\times 5$, from Worthington, Massachusetts, B. L. Robinson, no. 649; FIG. 3, floret, $\times 10$, from St.-Hubert, Quebec, Victorin & Rolland, no. 33,968; FIG. 4, grain, $\times 10$, from shore of Delaware River, Sussex County, New Jersey, September 15, 1917, E. B. Bartram.

PLATE 753. MUHLENBERGIA RACEMOSA (Michx.) BSP.: FIG. 1, TYPE (two pieces) $\times \frac{1}{2}$, of *Agrostis racemosa* Michx., basis of species, from Herb. Michaux, Paris, kindness of Professor Humbert; FIG. 2, panicle, $\times 1$, from Menard County, Illinois, 1861, E. Hall; FIG. 3, panicle, $\times 1$, from near Princeville, Peoria County, Illinois, V. H. Chase, no. 940; FIG. 4, spikelet, $\times 10$, from Fort Snelling, Minnesota, Mearns, no. 747; FIG. 5, floret, showing basal villi, $\times 10$, from no. 747; FIG. 6, grain, $\times 10$, from near Oquawka, Illinois, Patterson.

PLATE 754. MUHLENBERGIA RACEMOSA (Michx.) BSP.: FIG. 1, a characteristic summit of a plant, $\times 1$, from Fort Snelling, Minnesota, Mearns, no. 747; FIG. 2, summit of glabrous and lustrous internode and node and base of sheath, $\times 5$, from La Crosse, Wisconsin, 1861, T. J. Hale; FIG. 3, portion of panicle, $\times 4$, to show the small anthers, from near Princeville, Peoria County, Illinois, V. H. Chase, no. 940.

PLATE 755. MUHLENBERGIA SETOSA (Spreng.) Torr.: FIG. 1, TYPE of *Polypogon setosus* Spreng., basis of the species, \times ca. $\frac{1}{3}$, from Herb. Berol., kindness of Professor Diels; FIG. 2, panicle, $\times 1$, from Walpole, Massachusetts, September 7, 1896, J. R. Churchill; FIG. 3, panicle, $\times 1$, from northwest of Pleasant Valley, Bucks County, Pennsylvania, September 15, 1923, Benner; FIG. 4, portion of rhizome, to show appressed scales, $\times 4$, from west of Centreville, Digby County, Nova Scotia, Graves & Linder, no. 19,865; FIG. 5, portion of panicle, $\times 4$, to show long anthers, from Walpole, Massachusetts, September

2, 1883, *Walter Deane*; FIG. 6, group of spikelets, $\times 10$, from Muddy Pond, West Roxbury, Massachusetts, *C. E. Faxon*; FIG. 7, floret, $\times 10$, showing few slender basal villi, from Mt. Bethel, Northampton County, Pennsylvania, October 4, 1908, *Van Pelt*; FIG. 8, grain, $\times 10$, from the last (*Van Pelt*) specimen.

PLATE 756. *MUHLENBERGIA SETOSA* (Spreng.) Trin.: FIG. 1, TYPE of *Polypogon glomeratus* Willd., basis of *M. glomerata* (Willd.) Trin., $\times \frac{1}{3}$, from Herb. Willdenow, kindness of Professor *Diels*; FIG. 2, opaque and puberulent internode and node and base of sheath, $\times 5$, from northwest of Pleasant Valley, Bucks County, Pennsylvania, September 15, 1923, *Benner*.

PLATE 757. *MUHLENBERGIA SETOSA* (Spreng.) Trin., var. *CINNOIDES* (Link) Fern.: FIG. 1, TYPE of *Dactyloctenium cinnoides* Link, basis of the variety, \times ca. $\frac{1}{3}$, from Herb. Berol., kindness of Professor *Diels*; FIG. 2, panicle, $\times 1$, from Grand Falls, Newfoundland, *Fernald & Wiegand*, no. 4531; FIG. 3, portion of panicle, to show elongate anthers (as black lines), $\times 4$, from Fort Kent, Maine, August 21, 1913, *R. W. Woodward*; FIG. 4, floret, to show villi running high on lemma, $\times 10$, from no. 4531; FIG. 5, grain, $\times 10$, from River Ste. Anne des Monts, Gaspé County, Quebec, August, 1905, *Collins & Fernald*.

II. NOTES ON DANTHONIA

The two common species of *Danthonia* in eastern Canada, New England and New York are in general well defined, although the conventional differential characters of the lemma used by Hitchcock in Gray's Manual, ed. 7, and by Nash in Britton & Brown's Illustrated Flora are essentially valueless. As expressed by Hitchcock these are:

- "Teeth of the lemma triangular, not aristate.....1. *D. spicata*.
Teeth of the lemma aristate.
Flowers not over 5 mm. long.....2. *D. compressa*."

Under the specific treatments the lemmas of *D. spicata* are said to be "4-5 mm. long, sparsely clothed with stiff hairs, *teeth triangular*", while *D. compressa* has the "*teeth of the lemma aristate, at least 2 mm. long.*" In practice this character so frequently breaks that it has been abandoned by later authors, and in his Manual Hitchcock relies upon the contracted panicle and relatively short blades of *D. spicata* as contrasted with the more open panicle and longer leaves of *D. compressa*.

The best key I have seen is that of Wiegand & Eames in their Flora of the Cayuga Lake Basin. For wholly typical *D. spicata* and *D. compressa* it is satisfactory; the difficulty is that so much material is not typical. In the series which everyone would accept as *D. spicata* in the broad sense, the lemma varies from 2-6.5 mm. long and its back may be densely pilose, sparingly pilose, strigose or quite glabrous, its teeth from broadly triangular to lance-attenuate and awnless or awned. Such variation is

largely without apparent geographic limit, though two well defined geographic varieties, var. *pinetorum* Piper and var. *longipila* Scribn. & Merr., are strongly marked; the former boreal and transcontinental, with lemmas often so large as to be mistaken for those of *D. intermedia* Vasey; the latter with the shortest lemmas of the series and a definitely southern range. The sheaths and blades of any of the variations may be glabrous, sparingly pilose or even long-villous; and to the latter tendency, without checking the original account, has been erroneously applied the name var. *longipila*. If forms of the common northern plant with pubescent foliage are to be distinguished, they have an earlier name, evidently intended for them, in *D. spicata*, var. *villosa* Peck (1894).

My chief reason for now publishing this note is to direct attention to a complex series of very large plants which in some ways stand between *Danthonia spicata* and *D. compressa* but which, in extreme development, have been mistaken for the southeastern *D. sericea* Nutt. These are the coarse midsummer- or autumn-flowering plants with stout culms up to 1 m. high; long, stiff and mostly erect basal leaves; panicle as in *D. spicata* but with more numerous and larger spikelets; glumes up to 2.5 cm. long; and lemmas up to 6.5 mm. long; these and the long glumes often leading collectors to place New England specimens with the more southern *D. sericea*. In this complex and mostly northern coarse series the culms may be terete to base, as in *D. spicata*, or the lower internodes may be trigonous or laterally compressed and with the narrower side broadly concave, as in *D. compressa*. The uppermost leaf may be short and remote from the long-exserted panicle, as in *D. spicata*, or (even from the same root) prolonged and reaching or overtopping the panicle as in *D. compressa*. The twisted base of the awn may be dark brown to purplish, as in *D. spicata*, or stramineous or pale, as in *D. compressa*. The panicle is more like that of *D. spicata* but large and dense. Furthermore, whereas *D. spicata* (typical) flowers in New England from late May to early July and *D. compressa* in June and July, the coarse plant flowers chiefly from August to October. If culms with trigonous to compressed lower internodes be selected they will belong to *D. Alleni* Austin (1872), while other culms (often in the same tussock), with the inter-

nodes terete, will be *D. Faxoni* Austin (1877). It might be assumed that *D. Alleni* (including *D. Faxoni*) is a series of hybrids, with unusual hybrid vigor; but it is found to the northeast of the limit of *D. compressa*, while to the northwest it extends 450 miles north of the northwestern limit of the latter species. If sometimes a hybrid it is not always so.

In many of its stations *Danthonia Alleni* occurs in recent clearings or burns where the loose litter and often the ashes from fires stimulate all plants; in such cases it appears like overstimulated specimens, in which rankness of growth, multiplication of spikelets and enlargement of their parts are the result. In other cases the autumnal coarse culms and panicles suggest the second flowering in many species of *Carex*, where autumnal inflorescences are larger, fuller and often more crowded than the normal vernal ones. Again, the panicles of *D. Alleni* may be greatly distorted and with apparent signs of fungus- or insect-attack, with gnarled or crumpled branches, tendencies to fasciation, and sometimes the gathering of spikelets into glomerules. All in all, *D. Alleni* is a heteromorphic series well worth close observation by those situated to watch it. That it is a true species is very improbable. It is presumably the result of very diverse conditions which have resulted in parallel developments; and, in view of the well known development within the leaf-sheaths of this genus of cleistogamous florets, it is not improbable that every alteration of *D. spicata* and *D. compressa*, whether by crossing through wind-pollination or stimulation in other ways, may be somewhat perpetuated through the cleistogenes. Similarly the very diverse lemmas of *D. spicata*, whether with awnless or awned teeth triangular or lanceolate, the backs pilose or glabrous, may thus be carried on in local colonies. The genus is an appropriate one for close study from many viewpoints.

I am distinguishing the two undoubted species and the wholly dubious *Danthonia Alleni* by the following characters.

- a. Culms erect or straight, with stiffly erect panicles, the internodes terete (sometimes compressed or triangular in no. 2); basal crowded leaves much shorter than culm (sometimes elongate in no. 2), the lower cauline ones commonly 3–15 cm. long, the uppermost (except sometimes in no. 2) usually 1–10 cm. long and becoming remote from the panicle; ligule (except sometimes in no. 2) of stiff hairs 0.4–1.5 mm. long; panicle-branches ascending to erect, tightly appressed in fruit; spiraling base of awn usually

dark brown to purplish, strongly contrasting with the paler and straightish summit.

Culms slender, 0.5–1.5 mm. thick (dried) at base, 1–6 dm. high, with terete internodes; panicle remote from upper leaf, mostly with 2–13 spikelets; longer glume 7–11 mm. long, if longer with faint or obscure lateral nerves; base of awn dark-colored. 1. *D. spicata*.

Culms stout, 1.5–2.5 mm. thick at base, mostly 0.5–1 m. high, the lower internodes terete, or triangular and with one concave side; panicle either remote or closely subtended by upper leaf, dense, usually with 9–20 spikelets; longer glume lance-attenuate, 1.1–2.5 cm. long, prominently 3–7-ribbed; base of awn light to dark brown. 2. *D. Alleni*.

a. Culms slightly geniculate at the nodes, the summit usually arching; some of the lower internodes trigonous or compressed and often with the narrower side broadly concave; basal leaves prolonged, one half as long as to equaling culm; lower cauline leaves prolonged, 1.5–4 dm. long, the uppermost nearly reaching or overtopping the panicle; ligule 2–4 mm. long, of flexuous hairs; panicle lax and open or with branches finally loosely ascending, the remote lower branches usually strongly divergent, not closely appressed in fruit; spiraling base of awn pale brown or stramineous. 3. *D. compressa*.

1. *D. SPICATA* (L.) Beauv. consists of three fairly defined and many less definite variations, as follows.

a. Column of florets three fourths to quite as long as the firm glumes; panicle with (1–) 2–13 (–15) spikelets; lower leaves flat or involute; culms firm, 0.5–1.5 mm. thick at base.

Glumes lance-attenuate, tapering from near base, with 3–5 strong ribs besides the midrib, covering only the base of the column of florets, the sinus at crossing of the glumes one sixth to one fourth as high as the tip of the longest glume; basal marcescent leaves strongly curving and twisting

D. spicata, var. *typica*.

Glumes oblong-lanceolate, tapering from near or above the middle, with weak or obscure lateral ribs, usually covering all but the summit of the column of florets, the sinus at crossing of the glumes one fourth to half as high as the tip of the upper glume; basal leaves only slightly if at all curling. Var. *pinetorum*.

a. Column of florets only one half to three fifths as long as the thin and hyaline ribless or only faintly ribbed glumes; spikelets 3–7, scattered; culms delicate, 0.5–1 mm. thick at base; basal leaves filiform-involute or becoming so, curved. Var. *longipila*.

D. SPICATA (L.) Beauv., var. **typica**. *Avena spicata* L. Sp. Pl. i. 80 (1753). *A. glumosa* Michx. Fl. Bor.-Am. i. 72 (1803). *D. glumosa* (Michx.) Beauv. Ess. Agrost. 92, 153 and 160 (1812). *D. spicata* (L.) Beauv. ex Roem. & Schultes, Syst. ii. 690 (1817). *Merathrepta spicata* (L.) Raf. ex Hook. f. & Jacks. Ind. Kew. iii.

211 (1894) in synonymy. *D. spicata*, var. *villosa* Peck in N. Y. State Mus. Ann. Rep. xlvii. 168 (repr. 42) (1894), the form with villous blades. *Pentameris spicata* (L.) Nels. & Macbr. in Bot. Gaz. lvi. 470 (1913).—Dry to damp and peaty soils or in thin woodland, southern Quebec to Minnesota, south to Nova Scotia, New England, Long Island, northwestern Florida, Alabama, Tennessee and Missouri. May—early July.

Var. PINETORUM Piper, as *D. spicata pinetorum* Piper in Erythea, vii. 103 (1899), described in detail, although its author did not appreciate the characters, saying of it “scarcely more than a variety of that species [*D. spicata*], differing mainly in character of pubescence.” *D. thermalis* (as *thermale*) Scribn., U. S. Dept. Agric., Div. Agrost. Circ. no. 30: 5 (1901). *Merathrepta pinetorum* (Piper) Piper, Contrib. U. S. Nat. Herb. xi. 122 (1906). *M. thermalis* (as *thermale*) (Scribn.) Heller, Muhlenbergia, v. 120 (1909). *M. thermalis* (as *thermale*), var. *pinetorum* (Piper) Piper ex Fedde & Schust. in Just, Bot. Jahresb. xxxvii. 128 (1911). *Pentameris thermalis* (as *thermale*) (Scribn.) Nels. & Macbr. l. c. (1913). *D. pinetorum* (Piper) Piper in Piper & Beattie, Fl. Nw. Coast, 46 (1915).—Dry to moist open soil, Newfoundland and Côte Nord, Quebec, to British Columbia, south to Nova Scotia, New Brunswick, northern New England, Bruce Peninsula, Ontario, northern Michigan, northern Wisconsin, Black Hills, South Dakota, New Mexico and Oregon.—Since this variety has not been heretofore recorded from east of northern Michigan a few characteristic eastern specimens of it may well be cited. NEWFOUNDLAND: Glenwood, *Fernald & Wiegand*, no. 4600; Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 4601 and 4602; St. John’s Island, *Fernald et al.* no. 27,466; Middle Arm, Bonne Bay, *Fernald, Long & Fogg*, no. 1300; North Arm, Bay of Islands, *Long & Fogg*, no. 74; French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 76; Blomidon (“Blow-me-down”) Mountains, *Fernald & Wiegand*, nos. 2591 and 2595; Mt. Musgrave to Humber Mouth, *Fernald & Wiegand*, no. 2590. QUEBEC: Mingan, *St. John*, no. 90,140; Anticosti Island, *Victorin*, or *Victorin et al.* nos. 4077, 20,536 and 20,537, 20,542, 20,598, 24,344–24,346, 27,795, 27,797, 27,798, 28,050, 28,055 and 28,060; Percé, *Fernald & Collins*, no. 870; River Ste. Anne des Monts, *Fernald & Collins*, no. 413; Bic, *Fernalds & Collins*, no. 869; Rivière du Loup, *Victorin*, nos. 22 and 81; Montmorency Falls, *Macoun*, no. 69,231; Saint-Romuald, *Louis-Marie*, no. 20,541. NEW BRUNSWICK: Bass River, July 30, 1875, *Fowler*; Shediac Cape, *F. T. Hubbard*, no. 720. NOVA SCOTIA: St. Paul Island, *Perry & Roscoe*, nos. 64–66; Middleton, *Fernald, Pease & Long*, no. 19,953; Argyle, *Long & Linder*, no. 19,957; Abram River, *Fernald, Bean & White*, no. 19,956. MAINE: at 4000–4500 ft., North Basin, Mt. Katahdin, July 14, 1900, *Fernald*; Township

ix, Range 17, Somerset County, *St. John*, no. 2134; Madison, August 21, 1894, *Fernald*. NEW HAMPSHIRE; near Half-way House, Thompson & Meserve Purchase, *Pease*, no. 12,817. VERMONT: Willoughby, July 11, 1896, July 18, 1898 and September 14, 1898, *G. G. Kennedy*.

Var. LONGIPILA Scribn. & Merr. U. S. Dept. Agric., Div. Agrost. Circ. no. 30: 7 (1901).—Sandy or rocky woods and clearings, North Carolina and Alabama to New Mexico, north to Connecticut, Pennsylvania, Kentucky, Missouri and eastern Kansas. Late May–September. The following are characteristic. CONNECTICUT: Woodbury, July 13, 1932, *Eames*. PENNSYLVANIA: Philadelphia, 1862, *C. E. Smith*. VIRGINIA: eastern slope of Bull Run Mountain, Prince William County, *Allard*, no. 3850; south of Aldie, Fauquier County, *Allard*, no. 859; 4 miles northwest of Dixie Caverns, Roanoke County, *Wood*, no. 2609; Great Neck, Princess Anne County, *Fernald, Griscom & Long*, no. 4553; Claremont Wharf, Surry Co., *Fernald & Long*, no. 9829; Carey Bridge, Southampton County, *Fernald & Long*, no. 11,950; Cypress Bridge, Southampton County, *Fernald & Long*, no. 11,949. NORTH CAROLINA: Locust, Stanly County, *Blomquist, Correll & Garren*, no. 7753; Highlands, Macon County, *Biltmore Herb.*, no. 343°. KENTUCKY: Hawesville, Hancock County, *E. J. Palmer*, no. 17,804. ALABAMA: Mobile, *C. Mohr*, as *D. sericea*. MISSOURI: Indian Creek, Benton County, *Demetrio*, no. 87; Mansfield, *Lansing*, no. 3103. KANSAS: Cherokee County, *Hitchcock*, no. 905. OKLAHOMA: base of Rich Mt., near Page, Leflore County, *Stevens*, no. 2674. TEXAS: Dallas, *Reverchon*; Terrell, Kaufman County, May 4, 1904, *F. J. Tyler*. NEW MEXICO: 1847, *Fendler*.

When they published var. *longipila*, from Arkansas, Scribner & Merrill laid stress on the “scattered ascending hairs”, on the leaf-blades, a character which appears in the other varieties of the species and which may be absent from much material of otherwise good var. *longipila*. The distinctive features of this southern extreme are the very slender culms, usually filiform-involute leaves, and the small florets in relatively short columns, characters brought out in the original description: “A slender form . . . with small, few-flowered panicles and smaller spikelets than in the species. Leaf blades very narrow, involute . . . Flowering glumes 2 to 2.5 mm. long, pilose.”

2. D. ALLENI Austin in Bull. Torr. Bot. Cl. iii. 21 (1872). *D. Faxoni* Austin, l. c. vi. 190 (1877).—Open shores, rocky or arid openings, clearings and burns, Magdalen Islands to Algoma District, Ontario, south to Nova Scotia, Maine, Massachusetts,

Delaware, mountains of North Carolina, and Ohio. Late June—October.—The following, selected from twice as many specimens, are characteristic. QUEBEC: Baie St. Paul, Charlevoix County, Pease, no. 27,471. MAGDALEN ISLANDS: Grindstone, Fernald, Bartram, Long & St. John, no. 6870. PRINCE EDWARD ISLAND: Alberton, Fernald & St. John, no. 6869. NOVA SCOTIA: Canso, Guysborough County, Rousseau, no. 35,452 bis; Bridgewater, Lunenburg County, Fernald et al., no. 19,951. MAINE: Houlton, Fernald & Long, no. 12,659; Orono, September 25, 1890, and September 1, 1893, Fernald; Peaked Mt., Clifton, August 22, 1897, Fernald; Pleasant Pond, Somerset County, August 18, 1902, Collins & Chamberlain; Chesterville, Kate Furbish; Oxford, July 12, 1914, Weatherby; Pleasant Mt., Denmark, Pease, no. 19,628; Cutler, August 19, 1902, Kate Furbish; Pembroke, Fernald, no. 1309; Somesville, Mt. Desert I., September 22, 1892, Fernald; Southport, August 1, 1894, Fernald; Bear Mt., Livermore, July 25, 1896, Kate Furbish; South Berwick, Parlin & Fernald, no. 934. NEW HAMPSHIRE: Gorham, Pease, no. 17,337; Notch of the White Mts., August 27 and September 3, 1877, C. E. Faxon, TYPE collection of *D. Faxoni*; Crawford Notch, Greenman, nos. 1276 and 1277; Crawford Notch, Hart Location, Pease, no. 11,727; base of Mt. Willard, August 28, 1877, Faxon; North Woodstock, Woodstock, Fernald, no. 11,550; Plymouth, Fernald, no. 14,995; Washington, Fernald & Svenson, no. 768; Nashua, Fernald & Svenson, no. 769; Pelham, 1895, F. W. Batchelder. MASSACHUSETTS: Amesbury, 1897, A. A. Eaton; Pepperell, August 30, 1886, C. W. Swan; Concord, September 8, 1858, Thoreau; Ashland, July 3, 1884, W. Deane; Savin Hill, Dorchester, September 5, 1852, Wm. Boott; Plymouth, Fernald, no. 767; Brewster, Fernald, no. 17,948; Chatham, Fernald & Long, no. 8751; Nantucket Island, Bicknell, no. 9854; Shrewsbury, J. W. Robbins, as *D. sericea* Nutt.; Whitcombe Summit, Berkshire County, H. D. House, no. 25,893. NEW YORK: Babylon, Long Island, T. F. Allen, ISOTYPES of *D. Alleni*, also Svenson, no. 6800; Rockaway, Long Island, September 20, 1869, W. H. Leggett. NEW JERSEY: Nanasquan, June 26, 1929, J. R. Churchill. PENNSYLVANIA: Chester Valley, 2 miles north of Devon, Chester County, October 24, 1921, H. B. Meredith. DELAWARE: “**WM. M. CANBY, WILMINGTON, DELAWARE**”. NORTH CAROLINA: Roan Mt., July, 1889, Scribner. ONTARIO: Cloche Peninsula, Manitoulin District, Fernald & Pease, no. 3103; cliffs by Lake Superior, Pancake Bay, Algoma District, Pease & Ogden, no. 24,989. OHIO: near Garrettsville, Portage County, June 19, 1910, A. N. Rood.

3. *D. COMPRESSA* Austin in Peck, N. Y. State Mus. Ann. Rep. xxii. 54 (1869). *D. spicata*, var. *compressa* (Austin) Wood, Am. Bot. and Fl. pt. 4: 396 (1873). *Merathrepta compressa* (Austin) Heller, Muhlenbergia, v. 120 (1909). *Pentameris compressa*

(Austin) Nels. & Macbr. in Bot. Gaz. lvi. 469 (1913).—Woodlands and clearings, southern Quebec to Ohio, south to Nova Scotia, New England, Long Island, Virginia, and upland of North Carolina and Tennessee. June–August.

III. ERIANTHUS BREVIBARBIS AND OTHER SPECIES

(Plates 758–761)

ERIANTHUS coarctatus, sp. nov. (TAB. 758), culmis rigidis 0.75–1.5 m. altis, ad basin 3–6 mm. diametro, nodis 4–6 barbatis barbis deciduis; foliis caulinis 4–6, vaginis glabris, laminis scabris e basi valde angustato sublanceolato-linearibus 2–10 mm. latis nerviis lateralibus prominulis utrinque 3–5; lamina superiore valde reducta 4–12 cm. longa; panicula lanceolata densa 1–1.7 dm. longa 3–4 cm. diametro basi deinde exserta, racemis valde adpressis 2–5 cm. longis; spiculis sessilibus lanceolatis, glumis strigoso-hirtellis 6.5–8 mm. longis, coma basilari 4–5 mm. longa; pedicellis strigoso-hirtellis; arista tereti porrecta 1.6–2 cm. longa.—Delaware, eastern Maryland and eastern Virginia. DELAWARE: fencerow, $\frac{1}{4}$ mile east of Ellendale, Sussex County, October 12, 1940, *R. R. Tatnall*, no. 4745. MARYLAND: roadside 5 miles north of Princess Anne, Somerset County, October 2, 1937, *R. R. Tatnall*, no. 3574. VIRGINIA: peaty swale (cut-over cypress swamp), about 4 miles northwest of Homeville, Sussex County, September 20, 1937, *Fernald & Long*, no. 7301, as *E. brevibarbis* Michx. (TYPE in Herb. Gray); alluvial woods along Nottoway River, Green Church Bridge, northwest of Owen's Store, Sussex County, October 14, 1941, *Fernald & Long*, no. 13,884. All but the last distributed as *E. brevibarbis*.

Var. **Elliottianus**, var. nov., planta major; culmis ad 2 m. altis ad basin 6–10 mm. diametro; laminis 7–12 mm. latis; panicula laxiore majoreque 2–4.5 dm. longa 4.5–10 cm. diametro, racemis 4–8 cm. longis.—North Carolina to Florida. TYPE: thicket bordering pond near Live Oak, Florida, October 10, 1901, *A. H. Curtiss*, no. 6940, as *E. alopecuroides*, var. *brevibarbis*.—The plant beautifully described as *E. brevibarbis* by Elliott, Sk. i. 39 (1816) and very crudely illustrated by him.

Erianthus coarctatus and var. *Elliottianus* have passed, ever since Elliott, as *E. brevibarbis* Michx. Nash in North Am. Fl. xvi¹. 93 (1909) cites for *E. brevibarbis* the "TYPE LOCALITY: Tennessee" and then gives the range "Delaware to Florida, west of Louisiana"; while Hitchcock, Man. 723 (1935) says "Moist places, Coastal Plain, Delaware to Florida and Louisiana", but on p. 854 cites the type as from "Tennessee and Carolina, Michaux." Michaux, in originally describing it, Fl. Bor.-Am. i.

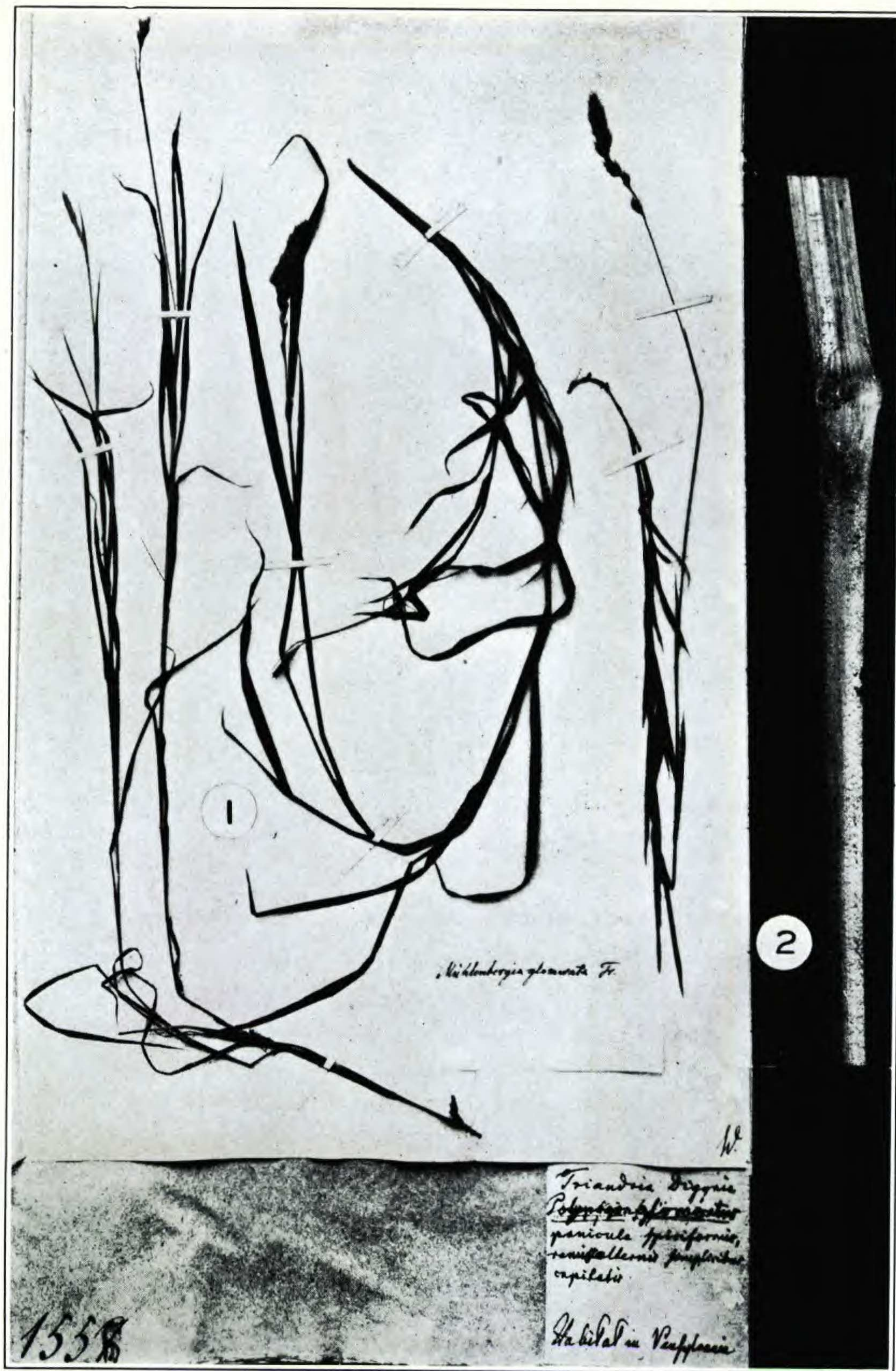


Photo. B. G. Schubert.

MUHLENBERGIA SETOSA (M. GLOMERATA): FIG. 1, type of POLYPOGON GLOMERATUS, $\times \frac{1}{3}$; FIG. 2, characteristic opaque and puberulent internode and node and base of sheath, $\times 5$, from Pennsylvania.

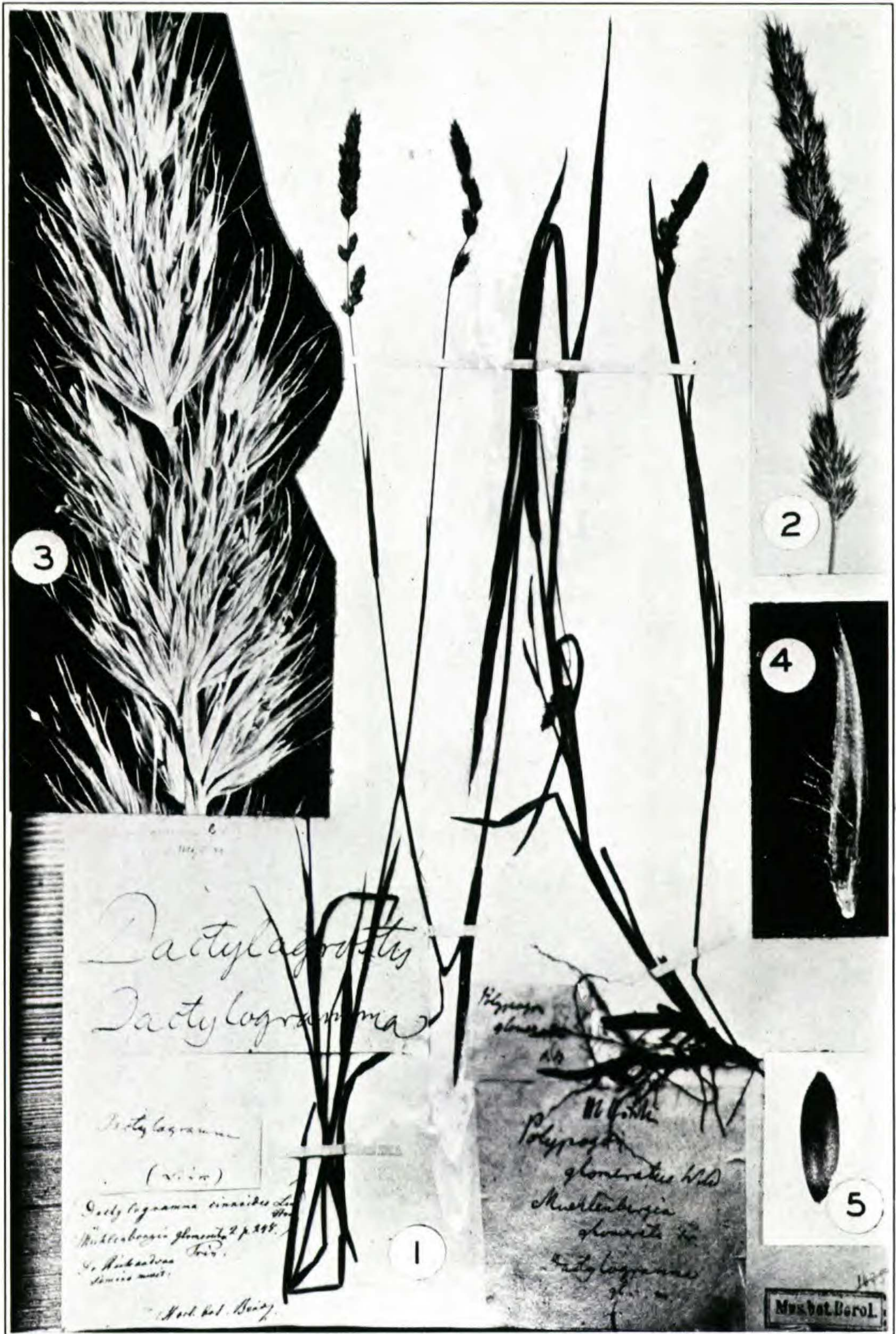


Photo. B. G. Schubert.

MUHLENBERGIA SETOSA, var. CINNOIDES: FIG. 1, type of DACTYLOGRAMMA CINNOIDES, $\times \frac{1}{3}$; FIG. 2, panicle, $\times 1$, from Newfoundland; FIG. 3, portion of panicle to show elongate anthers, $\times 4$, from Maine; FIG. 4, floret to show villi running high on lemma, $\times 10$, from Newfoundland; FIG. 5, grain, $\times 10$, from Quebec.

55 (1803), said "*HAB. in collibus Tennassée et Carolinae*". The discrepancy in Michaux's statement (and his label) and the Coastal Plain range of the plant usually taken to be *E. brevibarbis* has often been noted; and when Hitchcock examined the Michaux TYPE he wrote:

***Erianthus brevibarbis* Michx.**

"In collibus desertis ab amnio Wabash ad Ostium Missouri 5 diebus distantibus". The specimen belongs to the species described in Small's Flora under this name. The range as originally published is "in collibus Tennassée et Carolinae". The known range is from Delaware southward along the coast to Florida, and west to Louisiana. We do not know of its occurrence in southern Illinois, as given on Michaux's label.—Hitchc. Contrib. U. S. Nat. Herb. xii³. 151 (1908).

Michaux's type, with the label as quoted by Hitchcock, is here reproduced $\times \frac{1}{2}$, as PLATE 759, FIG. 1. That it is very unlike the Coastal Plain plant for which it has passed is evident. Its apparently mature and disintegrated panicle is hidden amongst the broad and prolonged leaves and enlargements of the spikelets, FIG. 2, $\times 1\frac{1}{2}$, show them to be like those of the plant (PLATE 760) of Pulaski County, Arkansas, distributed by Dr. Delzie Demaree (by creek near old quarry, Pulaski Heights, Little Rock, September 23, 1931, *Demaree*, no. 8228). Like that of the Michaux type the panicle (PLATE 760, FIG. 1, $\times \frac{1}{2}$) of Demaree's no. 8228 is disintegrating. In equivalent latitudes of the Coastal Plain *E. coarctatus* sheds its fruit from mid-October into November. Since the Demaree plant is so like Michaux's type from well up in the Mississippi Valley we may note that it has 10, instead of only 4–6 nodes; the leaf-blades broader (up to 1.5 cm. wide) and with more numerous veins (the more prominent veins 6–8 each side of the midrib); the mature panicle partly included at base and greatly exceeded by the broad upper blade (2.3 dm. long); the glumes (PLATE 759, FIG. 3, $\times 6$) with glabrous and lustrous surfaces (Michaux said "valvis acutissimis, nudis"); the more abundant beard up to 6 mm. long; and the awn (PLATE 760, FIG. 3, $\times 3$) only 8–10 mm. long, less than twice, instead of nearly thrice the length of the glumes.

The collection in Arkansas of a plant which closely matches the Michaux type and which is so different from the *Erianthus "brevibarbis"* of most authors supports Michaux in his statement on the label. Although the assertion (generally attributed to

Richard who issued the work after the death of Michaux) in the original publication, that it came from hills of Tennessee and from Carolina does not coincide with the original label, there is now clear evidence that a plant like Michaux's does occur in the Mississippi basin. It is not without significance that Hackel, the master of the *Gramineae*, doubted the identity of Michaux's plant with that of Elliott. In his great work on the *Andropogoneae* in DC. Mon. Phan. vi. 131 (1889), treating *E. brevibarbis*, as *E. saccharoides* subsp. *brevibarbis*, he accurately described the newly recognized *E. coarctatus*, var. *Elliottianus*, doubting if he had the Michaux species (transferred by Persoon to *Saccharum*), his citations reading: "Er. brevibarbis Mich. . . . ?, certe Elliott, Sketch . . . et aliorum auctt. amer.; Sacch. brevibarbis Pers. . . . ?" His doubt seems to have been justified; at least, *E. coarctatus* and *E. brevibarbis* seem quite as distinct as do most of our species in the genus. As to the range of the latter, it is yet to be worked out. The botanists of Indiana, Illinois, Tennessee and Missouri seem not to have noted it; and, although Demaree's label bears the memorandum, "New to Ark.", Hackel, l. c. cited as *E. brevibarbis* Arkansas material at Berlin, received from Engelman. Michaux's label, giving the data, on dry hills 5 days distant from the River Wabash toward the mouth of the Missouri, means that he got it in southern Illinois, presumably between Jefferson County at the east and Randolph County at the west. On August 23, 1795, Michaux, with an Indian, and a horse to carry his baggage, left Vincennes on the Wabash, in Knox County, Indiana, and on the 28th spent the day drying out his water-soaked collections by a camp-fire, reaching Kaskaskia, in Randolph County, Illinois, on the 30th. From late August to October 2 he collected up and down the Mississippi, with Kaskaskia as a base, and then returned to the Ohio. Five days travel from Vincennes, allowing for the stops recorded in Michaux's diary, means that he got *Erianthus brevibarbis* in southwestern Illinois; and it is clear that his over-mature material was collected, at latest, in early October. The latter fact and the over-ripe material from Arkansas, collected on September 23, indicate that true *E. brevibarbis*, although little known, is a relatively early species to mature.

In habit and in dense panicle with appressed-ascending

branches, typical *Erianthus coarctatus* strongly suggests *E. strictus* Baldwin; but the panicle of *E. strictus* is more slender and elongate and its spikelets are naked at base or with the merest suggestion of a greatly abbreviated coma at the tips of some pedicels. Furthermore, in eastern Virginia *E. strictus* is the earliest-flowering species of the genus, our 8 collections, from young anthesis to mature fruit ranging in date from July 20 to September 19, with a single one, from wet woods, secured on October 18; the Virginia collections of *E. coarctatus*, both immature, were made on September 20 and on October 14.

Michaux, who established the genus *Erianthus*, did not realize the complexity of the genus. He recognized but two species: his *E. saccharoides*, "a Carolina ad Floridam", with "gluma villis involucrantibus multo brevior", identical with *Anthoxanthum giganteum* Walt. (1788); and *E. brevibarbis*. *E. strictus*, *E. coarctatus* and other species which he must have encountered and collected, were not worked out by him or, presumably, were confused with those of which types are preserved.

Related to *Erianthus brevibarbis* and *E. coarctatus* in having the terete awns projected forward (rather than flattened ones spirally twisted at base and with the straightish tip thrown somewhat to one side) are two plants with thicker panicles and with coma exceeding the glumes: *E. saccharoides* Michaux or *Anthoxanthum giganteum* Walt. = *E. giganteus* (Walt.) F. T. Hubbard and sensu Hitchcock, but certainly not *E. giganteus* Muhl., to whom Hitchcock erroneously ascribes the species; and *E. compactus* Nash. Before considering the differences between these two it is necessary to consider the correct name for the plant which Hitchcock, Man., is calling *E. giganteus*, for it is quite clear that his discussion (Man. p. 854) was based on confused ideas and inaccurate quotation of Muhlenberg's Catalogue. Hitchcock's paragraph is as follows:

(5) ***Erianthus giganteus*** (Walt.) Muhl., Cat. Pl. 4. 1813. Based on *Anthoxanthum giganteum* Walt. Later (Descr. Gram. 192. 1817) Muhlenberg uses the name for both *E. saccharoides* [Michx., 1803] and *E. alopecuroides* [L. (Ell.)] (his herbarium specimen under this name including both species), but the description (awn twisted) applies better to *E. alopecuroides*. *Erianthus giganteus* was published as new by Hubbard (*Rhodora* 14: 166 (1912) based on *Anthoxanthum giganteum* Walt.

If, as Hitchcock definitely states, the name *Erianthus giganteus* Muhl. Cat. had been based on *Anthoxanthum giganteum* Walt., there was no need of a new combination by Hubbard; but Hubbard in 1912 was following the International Rules of that period and, as he clearly and correctly explained, *E. giganteus* Muhl. Cat. (1813) was NOT based on *Anthoxanthum giganteum* Walt., but was a change of name by Muhlenberg of *Andropogon alopecuroides* L. Since by present-day rules Muhlenberg had no right to give the new specific name, instead of using the one assigned by Linnaeus, Muhlenberg's quite new name, *Erianthus giganteus*, is illegitimate; but, by the "homonym rule", adopted in the International Rules since Hubbard wrote, there is no room for a second *E. giganteus*, based on Walter's name, especially since Walter's species is admittedly identical with *E. saccharoides* Michx. As to Hitchcock's flat statement that Muhl. Cat. (1813) based the name *E. giganteus* upon *Anthoxanthum giganteum* Walt., the following reproductions of Muhlenberg's text indicates that the statement could not have been verified. The first reproduction is from ed. 1 (1813), the second from ed. 2 (1818).

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|-----|----------------------|----------------|------------|
| [1] | 26. ANTHOXANTHUM, | SPRING GRASS, | |
| | 2. giganteum | } gigantic, | |
| | Walter v. erianthus | | |
| | 27. ERIANTHUS, | ERIANTHUS, | semen 1. |
| | 1. giganteus, 2 | } gigantic, | Car. Virg. |
| | andropogon, | | |
| | alopec. L. | | |
| [2] | 27 ANTHOXAN'- | } SPRING GRASS | semen 1. |
| | THUM | | |
| | 2 giganteum, | } gigantic | |
| | Walter. v. erianthus | | |
| | 28 ERIANTHUS | ERIANTHUS | semen 1. |
| | 1 giganteus 2 | } gigantic | Car. Virg. |
| | <i>Andropogon</i> | | |
| | <i>alopec. L.</i> | | |

It is perfectly clear that Muhlenberg was maintaining Walter's *Anthoxanthum giganteum* under *Anthoxanthum!*, though with the rather vague intimation ("v. [vel] erianthus") that it was perhaps an *Erianthus*. He made no combination based directly upon it; but his *Erianthus*, the next genus, consisted of two other species, 1. *giganteus*, a substitute-name for *Andropogon alopec[uroides]* L., and 2. *E. brevibarbis* Michx., already discussed. In his Cat.